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TELEPHONE ENGINEER

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THE NATIONAL TELEPHONE MAGAZINE

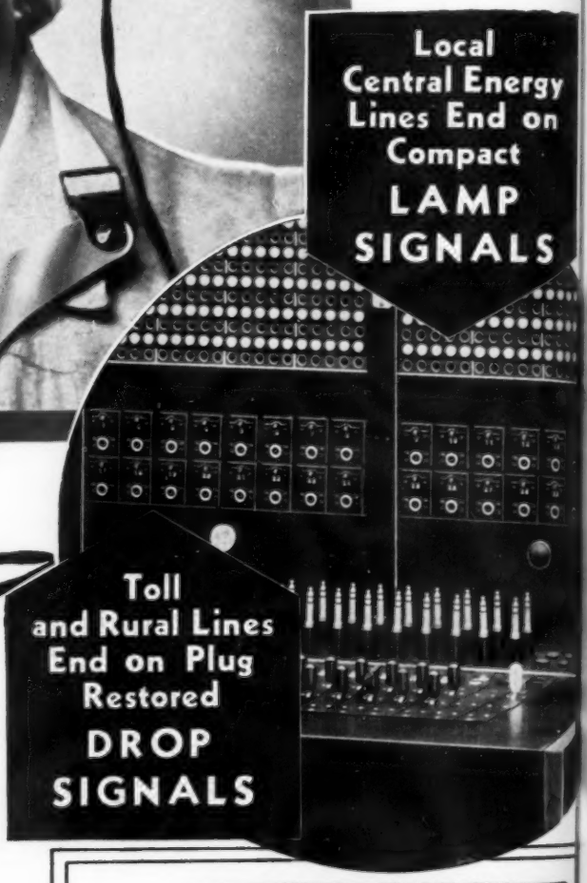
1941

FEBRUARY 15

NEWS OF THE INDUSTRY...REPORT ON MINNESOTA CONVENTION... FEATURES BY: B. C. BURDEN, R. A. CLARK, JR...WASHINGTON NEWS

MANAGEMENT
ENGINEERING
MAINTENANCE

SUBSCRIBERS ARE PRAISING THE "Big Town" SERVICE WE GIVE THEM NOW



We HAVE JUST INSTALLED A STROMBERG-CARLSON No. 106 NON-MULTIPLE SWITCHBOARD — THE IDEAL EQUIPMENT FOR AN EXCHANGE OF 400 LINES OR LESS.

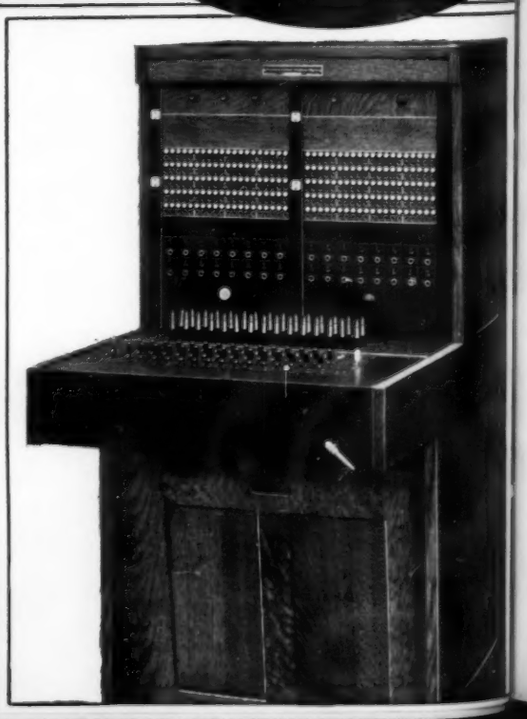
The Stromberg-Carlson No. 106 Non-Multiple Switchboard is designed to enable the small town exchange to give its subscribers big city central energy telephone service. The board can be installed in one or two positions—the ultimate capacity being 400 central energy local lines and 96 drop-ended toll or rural lines in two positions.

The Stromberg-Carlson No. 106 Non-Multiple Switchboard does away with the use of batteries on the subscriber's premises; maintains uniform battery supply for operating local lines; relieves rural subscribers of the annoyance of ring-off signals on the connected line; provides the operator with positive supervision on all connections, and eliminates the necessity of long reach by the operator as a result of the compactness of lamp signals.

The local central energy lines end on compact lamp signals and the rural lines end on either plug-restored drops or lamps.

If you are operating a 400 line exchange, let us send you a complete Bulletin describing how this switchboard will permit you to give better service.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Factory and General Offices: 100 Carlson Road, Rochester, N. Y., U. S. A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto



Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY-FIVE YEARS

The National Defense Program and the LEICH Organization

For years, Leich Electric Company has been an established supplier of communication equipment for the armed forces of the United States. Today, in common with other telephone manufacturers, Leich is busily engaged in the production of specialized telephone apparatus for the National Defense Program. Throughout 1941, an even greater share of Leich's productive capacity will be devoted directly or indirectly to Defense needs.

By careful planning, Leich has thus far been able to meet Defense requirements without serious impairment of normal deliveries to telephone companies.

Because of the Company's modernization program of the past several years, today the Leich plant is equipped with up-to-the-minute machine equipment. Recently, an addition to the Leich factory was completed and will be occupied shortly. With this augmented plant capacity and with a greater number of skilled workmen than ever before, Leich is ready to do an increasing share in coping with the national emergency.

To its hundreds of customers among independent telephone companies, Leich respectfully urges the earliest possible scheduling of equipment requirements. Whenever telephone apparatus is to be procured for local Defense needs, this fact should be stated. Co-operation will mean maximum production — minimum delay — unimpaired service.

The Leich organization has always been noted for its close relationship with its customers. Now, if ever, will the results of this "teamwork" be known. It is to be hoped that both will emerge from the unpredictable months ahead with a record of splendid service to the public and to the Nation.

A. C. REID
President LEICH Electric Company

ROY W. SIEMUND
President LEICH Sales Corporation

We have just been notified of the death of Mrs. Jay Houghtaling. We feel that the entire Independent industry join with us in sympathies to Jay. Jay is a real old-timer and is one of the oldest representatives, in point of service, of the Kellogg Switchboard & Supply Company.

▲

May we thank W. P. Frasure, Savanna, Ill., for his prompt response to claim his $2.50 award from a suggestion to Quizzicus carried in our January issue. His letter, claiming his money, informed us that fellow workmen had already designated what he could do with it—which is a good idea if it works. He sent another suggestion to Quizzicus, so maybe he will buy two—er ah—get another reward.

▲

As we go to press we have just learned that our friend and yours —John Jaap of Cook Electric, has been operated on at Evanston Hospital, Evanston, Ill. At this writing we understand he is doing quite well. John has been with Cook Electric since 1914. Elsewhere in this issue you will see his picture in a candid camera shot and also notice of his appointment as Assistant Secretary of his company.

▲

And here is an orchid to members of the Minnesota Association and their able and efficient secretary-treasurer J. C. Crowley, Jr., for a very worthwhile convention.

TELEPHONE ENGINEER

MANAGEMENT - ENGINEERING - MAINTENANCE

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Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

THE intensifying of the national defense preparedness activities is increasing daily and during the next few weeks is gauged to hit a high tempo. The managements of the telephone industry—both operating and manufacturing—can observe the trend of this increasing high speed of defense efforts through analyzing the announcements of new policies and ventures in the military preparedness which emanate practically every day from Washington.

Up to the present the imposing of drastic and "full force" steps on industry to heighten the defense activities is not in immediate sight and the Army and Navy and OPM (Office of Production Management) authorities do not wish to invoke such moves until they become absolutely imperative. For the telephone industry, as has been cited in our previous reports from Washington, there is general accord about the highly satisfactory and efficient job being done for national defense both in the establishment of facilities for the growing Army and Navy encampments and bases and air fields and for the expanded defense production and munitions plants. In the telephone manufacturing field its activities are regarded as completely up to par in providing equipment and apparatus for the Army and Navy and there appears little likelihood of production priorities of a formal character being invoked for that industry.

In regard to priorities the OPM is most anxious to avoid the enforcement of such formal actions both in strategic raw materials and production. The machinery has been established for the raw materials priorities with the aim that through voluntary industry cooperation these problems can be solved. The executives selected for the handling of raw materials priorities are able and outstanding university engineering and technical educators who have had ample practical experience. With such appointees who are impartial and free from any previous company ties the priority situation can be administered without fear of "kick-backs"—it is interesting to note that practically all of these priority executives have been expert advisors in the work of the Army Industrial College.

Harry M. Engh, President, Pennsylvania Telephone Corp., Erie, will lead the Pennsylvania Independents during 1941.

(See story on page 37)

John H. Wright Honored

The congratulary message of a veteran figure in the Independent telephone industry — John H. Wright, President of the Jamestown, N. Y., Telephone Corp., and Vice President of the U. S. Independent Telephone Association —was a feature of the Jan. 25 inauguration ceremonies of the new president of the National Press Club in Washington, who is a Jamestown native. Mr. Wright's letter to the new National Press Club president, Melbourne Christerson who is day news editor of the Washington Associated Press Bureau, was read at the inauguration by U. S. Attorney General Robert H. Jackson. The Attorney General before he became a leading figure in the Roosevelt Administration was the general counsel and a director of the Jamestown Telephone Corp.

Manufacturing Requirements

THE prevailing policy on priorities is to attack them at the source of production—raw materials. For the telephone manufacturing industry many of its important strategic raw materials such as copper, lead, zinc etc. are under study, but there seems to be no aspects of shortages of these materials for necessary civilian use on the immediate horizon. However, it is understood that the telephone manufacturing industry has been ahead of the picture—as it has so often in the past—by surveying the potential alternative materials which could be used in event of greatly stepped-up defense requirements for these raw materials.

By the end of February, the telephone manufacturing industry will learn the future requirements of apparatus and equipment which the Army and Navy will require during the next fiscal year, beginning July 1, 1941, when the House Appropriations Committee completes its formulation of the War and Navy Departments Supply Bills. However, the Army Signal Corps in its equipment needs for next year will undoubtedly concentrate on the procurement of aircraft and field force radio apparatus since to a large extent its telephone supplies are in pretty good shape for the increased Army.

FCC

Because national defense preparedness dominates every other issue in the National Capital, Federal regulatory activities as exemplified by the FCC will be at a low ebb. In fact, it is recognized by the abler authorities in Federal circles that regulation has to be tempered in the present status of the telephone companies having to engage in greatly increased construction activities and expansion of their facilities to meet the Army and Navy needs. Compared to the hum and rush of work in the War and Navy Departments and OPM, the FCC activities are in a doldrum. Outside of such pending cases as the determination of FCC jurisdiction over exchange rates of an interstate character in the Kansas City-Southwestern Bell proceeding and the recent Pacific Coast toll rate order (covered in another section of this column), the FCC slate for the telephone industry is rather barren.

DCB Telephone Committee

EXCELLENT work of planning for communications preparedness in event

of American participation in the war or a greater national emergency is being performed by the industry technical committees of the Defense Communications Board, members of the Board have indicated. The Telephone Committee, headed by Z. Z. Hugus, Assistant Vice President of the American Telephone and Telegraph Co., and on which the Independent industry is represented by Louis Pitcher, USITA Executive Vice President, and Clyde S. Bailey, Washington USITA Representative, has held several sessions, including the latest in mid-February in New York. The Telegraph and Radio communications Committees on which A. T. & T. representatives are playing an important part also have staged several meetings since the Jan. 6 session of the DCB when the advisory and technical committees were organized.

The problem of representation of the three labor organizations which form the DCB's Labor Advisory Committee on the seven industry technical groups has not been finally decided. The three labor unions—AFL, CIO (American Communications Association), and the National Federation of Telephone Workers—proposed to the DCB that each of them should be represented by a member and alternate on the respective technical committees which would have added twenty-one new members and the same number of alternates to these bodies. However, the DCB is opposed to such a plan and wishes the labor unions to abide by its original instructions of only one labor member and alternate for each of the seven technical committees. The DCB, too, is desirous that the labor union representatives on these technical committees should be qualified expert communication employees and not merely union officials without background in communications. The DCB feels that labor representatives can make a contribution in the defense planning but should not regard the activities of the Board as a springboard for union organization or bargaining moves.

Division of Class A Companies

THE proposal for a division of the Class A telephone companies in connection with the Uniform System of Accounts and annual reports to the FCC and state commissions so as to relieve the smaller Independent carriers of too detailed accounting was considered at length at a recent meeting of the Accounts and Statistics Committee of the National Association of Railroad and Utilities Commissioners, but no definite action was determined for the solution of this situation.

The NARUC committee was understood to be in favor and completely sympathetic to the proposal which has been advanced by the United States Independent Telephone Association with the idea of segregating the Class A companies into two groups—one composed of smaller companies with modified accounting requirements and the other of the large carriers having annual revenues of $8,000,000 and upwards which would follow the detailed accounting systems.

The next move in the consideration of this segregation plan will come, the NARUC Committee determined, when a need for the expansion of the Uniform System of Accounts arises and this will occur at the time of formulation of new regulations for the continuing property record in the FCC Uniform System. The NARUC Committee requested the FCC to prepare a ten-

(Please turn to page 32)

Convention Dates

Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, March 11 and 12.

Texas Telephone Association, Texas Hotel, Fort Worth, March 19, 20 and 21.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 24 and 25.

Kansas Telephone Association, Hotel Jayhawk, Topeka, March 27 and 28.

Nebraska Telephone Association, Hotel Lincoln, Lincoln, April 8 and 9.

Iowa Independent Telephone Association, Hotel Fort Des Moines, April 15, 16 and 17.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 22 and 23.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 7 and 8.

Pennsylvania Independent Telephone Association, Penn Alto Hotel, Altoona, Pa., May 15, 16 and 17.

New York State Telephone Association, Hotel Jamestown, Jamestown, May 20 and 21. Golf day, May 19.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, May 28 and 29.

Wisconsin State Telephone Association, Loraine Hotel, Madison, June 4 and 5.

Executives Conference Set for April 29 and 30

The date for the Annual Spring Conference for Executives of Independent telephone companies has been announced by the U. S. Independent Telephone Association. They will meet at the Stevens Hotel, Chicago, on April 29 and 30.

These Conferences have been unusually well attended in past years and the 1941 meeting is expected to break former records of attendance because of the import of questions to be discussed. Complete details will come to you prior the Conference in the columns of this publication.

Quizzicus Gets a Reply

"Quizzicus"
Telephone Engineer
7220 Sheridan Road
Chicago, Ill.
Gentlemen:

We don't know how often a Quizzer in your "Quizzicus" column receives a perfect answer to his Quizzique, however, we believe that we now have the correct answer to question No. 4 in the October 15, 1940 issue. This question concerned an efficient trouble-free grade clamp and if "professional ethics" permit your disclosing a name and address, we would like very much to send a free sample of our newest clamp to your inquiring subscriber. Otherwise, we will gladly send you a new clamp if you would kindly forward it for us.

Congratulations on your fine work. I hope we can help in solving some of your Quizzicus' Quizzes.

Yours very truly,
Nelson D. Stoker
James R. Kearney Corporation

"Gophers" in Annual Convention at St. Paul

By RAY W. SMITH

G. M. Dwelle, of Lake City, Minn. was elected President of the Minnesota Telephone Association.

IN NEAR perfect cold sunshiny weather almost 350 telephone men and women attended the 32nd Annual Convention of the Minnesota Telephone Association on January 28, 29 and 30. Having assembled, they were treated to a well-diversified program as ever the editor of TELEPHONE ENGINEER attended. Secretary Jack Crowley, Jr., in an interview immediately following the closing session stated he was well pleased with the attendance, the program, and the results obtained.

G. M. Dwelle, Dwelle Telephone Co., Lake City, was elected president for 1941, succeeding W. A. Eckles, Blue Earth. Re-elected were: H. F. Leuders, Norwood, vice-president; and J. C. Crowley, Jr., secretary-treasurer. Fred Pfaender was the only new director selected. Re-elected directors were: Mr. Dwelle, Mr. Eckles, Mr. Leuders, Leland Wright, Alexandria, and S. A. Rask, Blooming Prairie.

The annual banquet was held the evening of the second day with festivities going far into the night. Following dinner a varied program of entertainment was offered culminated by dancing in the Ballroom of the Hotel Lowry, the convention headquarters.

WITH registration and visiting manufacturers exhibits taking up the forenoon of opening day the convention moved into high gear during the afternoon with W. A. Eckles presiding. He delivered the annual president's address in which the association year was reviewed. Following this address committees were appointed and other business discussed. Mr. Crowley, who is one of the most able state association executives in the industry was of material assistance during each session. Eulogies in memory of departed members and friends were read by Mr. Leuders, Joseph Kraker, Mr. Crowley and P. M. Ferguson. The latter is a director in both the Minnesota and U. S. Independent Telephone Association.

By the morning of the second day the attendance had swelled to standing room only proportions. Movies were shown depicting the story and make-up of co-axial cables and vacuum tubes. These were shown through courtesy of the Northwestern Bell and were well received.

Of particular interest to the assemblage, and also the editor, was the paper delivered by C. B. De Witt, manager of the Iowa-Minnesota Telephone Service. Mr. De Witt operates along the Iowa-Minnesota line with lines in both states. His story of the accomplishments of his company in regard to rural installations could be carried as a "success story" in any publication. In his address Mr. De Witt stated his belief was that many telephone men had missed the most important factor in the failure of rural subscribers to renew their telephone service as now their finances had increased to warrant their use of telephones and stressed the point that they were no longer a luxury but a NECESSITY of modern farm life.

Mr. De Witt described the method used by his company in rehabilitating service and the resultant huge gain in stations. Rules were promulgated by the company whereby service was only furnished to the subscriber with a 10c charge for any person borrowing the use of the telephone. This was later tightened to refuse service to anyone except the subscriber and his family. He further outlined their program of overhauling all lines and telephones at cost to the co-operatives switching thru them and making the instruments really work. This resulted in rate increases as well as station increases. He also discussed REA interference and his changing of line right of way to eliminate their impedance.

ELDON ROWE, Sup't, Bureau of Criminal Apprehension, spoke next on a subject of co-operation of telephone companies with low enforcement. He heaped much praise on the group for their service and cooperation and also informed them that in the future the highway police had been instructed

In a room at the Minnesota Convention, shown at the left are: Bud Brown, Enderlin, N. D., Red Parsons, Kellogg and C. M. Brown, Cooperstown, N. D. At top right is Tony Ryan, plant superintendent of the Central Iowa Telephone Company, Toledo, Ia. And the three gentlemen shown at the right are only remaining charter members of Minnesota Telephone Asosciation. Pete Ferguson, Mankato, is at the left, Lucien F. Clark (center) and Herman Lueders, Pioneer Telephone Company.

Reading from left to right. Top Row. John Jaap of Cook Electric Company. Chicago. 2. Ed Samp, LaCrosse Telephone Company and Harold Bollinger, Park Ridge Telephone Company, Park Ridge, Ill. 3. A. J. McInnes, secretary of the North Dakota Telephone Association, Fargo, N. D.

Second Row. Tom MaCoubrey, Public Accountant, St. Paul. 2. (Inset) Mrs. Jack Crowley, wife of secretary of the Minnesota Telephone Association. 3. Mrs. Dick Thompson, wife of the commercial manager of the Central Iowa Telephone Company, Toledo, Ia. 4. George Morse, Reliable Electric Company Chicago.

Bottom Row. Francis Schneider. Blue Earth Telephone Company and Zina Ackermann, Redwood Falls, Minn. 2. Messrs. Brooks and Grant Harris of Page and Hill Company, Minneapolis, Minn., and Pete Ferguson, Mankato Citizens Telephone Company.

to investigate all persons working on lines within the state. Identification cards will be needed by all workers on this type of work. The prevention of wire tapping on important messages as well as protection from sabotage will be the logical result.

The afternoon session was again crowded with J. R. Wiggins, managing editor of the St. Paul Dispatch as feature speaker. His subject "America's Role in the World Crisis" was so ably discussed and delivered that other speakers commented on his speech and our future actions should well be along the lines layed out by Mr. Wiggins. H. J. Miller, of the Minnesota Resources Commission was also heard during this session and outlined the development of jobs his commission was now striving to accomplish.

Louis Pitcher, executive vice president of the National association, gave a complete resume of the national situation in regard to the telephone industry and the actions of the U. S. Independent Telephone Association. Mr. Pitcher was greeted by the largest attendance of the meeting during his address as many matters of utmost importance were discussed during his talk.

A novel session was held the morning of the third day during which eight members gave their experiences on results after rate adjustments. Among these were: L. Batcheller, Madelina Telephone Co.; G. M. Dwelle, Dwelle Tel Co., Lake City; P. A. Glaeser, Pioneer Tel. Co., Waconia; G. S. Kidder, Claremont Tel. Co., Claremont; Bert Kleaver, Redwood Co. Rural Tel. Co., Redwood Falls; F. C. Marvin, Zumbrota Tel. Co., Zumbroat; Ed I. Miller, Kenyon Tel. Co., Kenyon, and Mr. Thompson, Central Iowa Tel. Co., Kiester, Minn. Rate adjustments have been made by the companies above and each man related the experiences before, during and after the adjustment. Secretary Crowley, of the Association, helped make this session very entertaining as he was of material aid.

Leland Wright, the popular boss-man of the Alexandria Tel. Co., Alexandria, handled the Open Forum of questions of interest to the telephone business. "Nubs" Wright is one of the real live wires of the Minnesota association and his work during the convention was very well handled. He has appeared before many of the other State associations as guest speaker. Following committee reports and unfinished business the meeting was adjourned at noon.

Convention Sidelights

C. B. De Witt, of the Iowa-Minnesota company, has a partner that he admits has as much "on-the-ball" as he does. You guessed it, its the Mrs. She attended every session and answered many questions during the Open Forum. **Jim Pfaender,** the Stromberg-Carlson man, was very much at home at this convention, as he is quite well known around New Ulm, Minn.

Pete Ferguson, whose picture you will notice in this issue with 2 other charter members of the Minnesota association, was much in evidence. **Herman Lueders** and **Lucien F. Clark** joined him especially to pose for this picture of charter members. **Red Parsons** of Kellogg makes the statement that he had a sure-fire remedy for heart disease and would be glad to explain his theory.

We enjoyed our visit in the exhibit rooms of Leich Sales mainly because of the big smiles **Dick Faulhaber** and **Bud Cadwell** are famous for. **Mr. and Mrs. L. O. Ollig,** of Winsted were also enjoying their hospitality.

Charles Deering, secretary of the National and also the Iowa association is one of the few people we know who never seems to get any older. We enjoyed lunch with him and **A. J. McInnes,** who is secretary of the N. Dakota Association. Mr. McInnes was introduced during sessions and had to make a speech before they would let him sit down. **Eddie Sears,** the Kellogg man, has one of those slow moving infectious smiles that makes you smile.

Several of the exhibitors and telephone men were wondering how to extend the meeting another week so they could see the Winter Carnival. **Mrs. C. B. DeWitt** solved the problem by going on a sit-down strike and was happily joined by C. B. He is an Army man. Major!

John Burke, National Carbon's Gray Label and Aircell battery man, always looks forward to the Minnesota convention he tells us. Possibly it was a Minnesota company that sent him the set of Gray Labels that had served continuously over a span of 7 years.

There was a lot of fun when **"Burf" Burfiend** of Automatic Electric found

J. C. Crowley, Jr., Minneapolis, was re-elected secretary-treasurer of the Minnesota Association. He was roundly applauded at the close of the sessions.

that his fishing partners **Pete Ferguson** and **Leland Wright** had not only sent him a scroll witnessing his fishing feat of hooking two fish on one line but that a reproduction was being carried in our February issue of Fortnightly TELEPHONE ENGINEER. Hope you read it—**'Nubs' Wright** swears its true.

W. A. Eckles once made an extended cruise on the Empress of Australia which brought the King and Queen to America some time ago and which was erroneously reported torpedoed lately. **Stan Lorens,** who preaches All-Relay for North Electric, was unusually busy during the entire meeting what with their exhibit being crowded most of the time. **Dorothy Balder,** who works with her brother in the Osakis Tel Co., tells us she has become a regular reader of our publication—we bow with thanks!

M. R. Thompson, Central Iowa Tele. Co., whose pretty wife is pictured in this issue received a big hand after his paper was presented on closing day. **Tom Macoubrey,** of St. Paul, was a friend in need and in deed when the editor found himself without hotel accomodations—thanks for the introduction to your club, Tom, we enjoyed your hospitality. Crapo's **Chas. Billica** and National Tel Supply's **Glenn Voyles** are a twosome hard to beat.

L. O. Ollig is the author of this one: "Flattery is soap—and soap is 90% lye."

Petition To Merge Keystone Companies Filed With FCC

THE elimination of the last remaining situation of competitive duplicate telephone service between Bell System companies and Independent companies in a major city and populous state—Philadelphia and Southern New Jersey—has been launched under way by the filing of an application with the FCC by the New Jersey Bell Telephone Co. to purchase all of the capital stock of the Imperial Securities Co., a subsidiary of the Theodore Gary & Co. The Imperial Securities Co. controls the Keystone Telephone System which operates the Independent telephone service in the Philadelphia area in competition with the Bell Telephone Co. of Pennsylvania and the two Keystone subsidiaries which operate telephone service in Southern New Jersey in competition with the New Jersey Bell.

The acquisition of the Imperial Securities Co. which constitutes the largest telephone consolidation proposal yet to come before the FCC has been pending for ten years under an agreement of Nov. 25, 1931, between the New Jersey Bell and an affiliate of the Theodore Gary & Co., the Midland Trading Co. If the FCC approves this acquisition which will come up under Section 221(a) of the Communications Act, the Bell of Pa. will apply for the purchase of the Keystone System to the Pennsylvania commission and the New Jersey Bell will seek the consolidation into its system of the two Keystone subsidiaries in its state, the Eastern Telephone and Telegraph Co. and the Camden and Atlantic Telephone Co.

In presenting its application, the New Jersey Bell in a statement by its President Chester J. Barnard and Frankland Briggs, Vice President and General Counsel, emphasized that the consolidation of the Keystone and its subsidiaries into the Bell System would be advantageous to the telephone subscribers in Philadelphia and Southern New Jersey because it would eliminate the unnecessary and uneconomical facilities and service in those two areas. The consolidation of the Keystone System, the New Jersey Bell informed the FCC, would bring about lower maintenance, supervisory and other costs of telephone service and would eliminate the nuisance to the public of two telephone systems.

The FCC gave no indication when a hearing will be held on the application, but it is thought that the Commission will require several weeks of investigation of the financial transactions proposed in the consolidation before embarking on a proceeding. However, the plan has been known to the FCC since 1934 so the inquiry into the ramifications of the financial arrangements should not require too long an investigation.

The application to the FCC noted that the Keystone System in the Philadelphia area operates around 45,000 stations of which only 2% are residential and all of these subscribers practically were Bell of Pa. subscribers. In the three Southern New Jersey Counties where the two Keystone subsidiaries operate the Independent companies had 4,500 stations while the New Jersey Bell in the same areas served 37,011 subscribers. Of the approximately 4,500 Keystone System stations in New Jersey, about 47% were duplicated by the subscribers with Bell service. In Philadelphia, the application stated the Bell of Pa. if the consolidation is consummated would retire from service substantially all of the Keystone plant with the possible exception of under ground conduit in Philadelphia some of which is leased to another utility.

A T & T Gains 129,400 Stations in Month

New York, Feb. 4—The American Telephone and Telegraph company today reported a gain of 129,400 telephones in service in the Bell system in January, compared with a gain of 111,300 in December and 94,600 in January, 1940. The total was 17,613,400.

Quick Justice

It was 12:55 p. m. on January 9 when County Attorney Quigley at Valentine, Neb., received a telephone call informing him that the bank at Merriam had been robbed. He immediately placed eight telephone calls to Bassett, O'Neill, Chadron and Omaha, all in Nebraska, and to Martin, Yankton, Winner and Rosebud, all South Dakota towns. All eight calls were completed by 1:04 p. m., nine minutes later. The bandit was apprehended at 1:30 and taken directly before Judge Meyer at Alliance, Neb. He pleaded guilty and was sentenced to a term of 18 years in the penitentiary by 8 o'clock that night.

Short Course in Telephone Transmission

By
B. C. BURDEN

Diode Tubes, Copper Oxide Units, Cold Cathode Tubes, Tungar Tubes (continued)

Theory of the Full Wave Rectifier

THE *full wave rectifier* may consist of an arrangement whereby two diodes or half wave rectifier tubes are so connected that one tube functions on one-half cycle and the other tube on the other half cycle resulting in both half cycles of the A. C. input wave being rectified. The advantage of a full wave rectifier over the half wave type is that the direct current wave is much smoother and more suitable for many purposes requiring a uniform steady direct current.

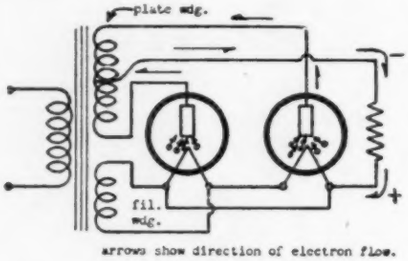

Fig. 15. — Circuit of a Full-Wave Rectifier Using Two Half-Wave Tubes

Figure 15 illustrates the circuit of the full wave rectifier using two half wave or diode tubes. Referring to the circuit, it will be observed that the plate winding has a center tap and this center tap is connected to the negative output terminal of the rectifier, while the two opposite ends of the winding are connected to the two plates. The filaments are connected in multiple, both being operated from the same filament winding.

The operation of this type of circuit is as follows: At any instant, one plate will be positive when the other is negative; hence, *there will always be electrons flowing toward the plate in one of the tubes.* These electrons will pass from cathode to plate of the tube whose plate is positive; thence, up the transformer winding to the center tap and along the center tap to the load terminals and then back to the filament. It can be seen from

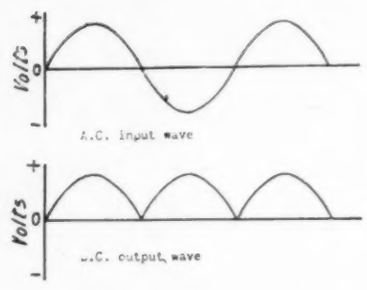

Fig 16. — Graphic Curve of Action of a Full-Wave Rectifier

this that one tube works while the other rests and vice versa. The input and output wave of the full wave rectifier appear differently from that of the half wave rectifier.

Referring to Figure 16, it can be seen that in our external D. C. circuit, both halves are present; hence, the term *full wave*. Strange as it may seem, the voltage across the output circuit would only be one-half of the total voltage at the plate winding, the same as for the half wave rectifier. This results from the fact that the load circuit is connected to the center tap which has only one-half of the total voltage between it and the plate that is operating at any instant.

Miscellaneous Rectifier Notes

GENERALLY a full wave circuit utilizes rectifier tubes containing two plates and two filaments. The two filaments being operated by the same filament winding source. Such a tube is connected in the circuit as shown in Figure 17. The operation is precisely the same as that explained for the separate tubes as the electrons that are emitted by the respective filaments are attracted only by their own associated plates, there is no intereference between the two sets of elements within the same glass envelope.

The amount of direct current that can be drawn from a vacuum tube rectifier depends upon the electron emitting properties of the filament and the general construction of the tube. In general for a given size transformer and the same size tube, a full wave rectifier is capable of supplying twice the amount of current that a half wave rectifier can supply. The current capacity of tubes such as are used as rectifiers in modern home radio receivers range from 100 milliamperes up to 250 milliamperes.

Output Characteristics of Common Type of Full-Wave Rectifier

ONE of the most widely used full wave rectifier tubes in electronic apparatus is the RCA—80. This tube is designed to operate with a maximum voltage of 400 volts on the plates and to furnish a maximum current of 110 milliamperes. The D.C. voltage at the output of a rectifier filter will depend on the internal impedance of the tube and whether or not the filter is the choke input or condenser input type.

Figure 17-A illustrates the characteristic of the 80 tube with choke input to the filter. Let us assume we have the rectifier in operation, with 400 volts A.C. applied to the plates of the 80 tube. When the load is drawing a current of 20 m.a. from the rectifier, the D.C. voltage at the output of the rectifier is 350 volts. If we increase our load until we are drawing 140 m.a., the output voltage of the rectifier falls to 280 volts. This drop of voltage is represented by the I.R. drop in the plate resistance of the rectifier tube. The slope of these curves then provides us with a measure of the regulation of the rectifier tube. The flatter the curve, the less voltage drop in the tube.

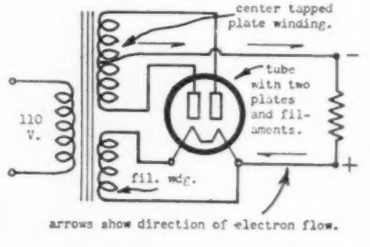

Fig. 17. — Circuit of a Full-Wave Rectifier Using One Full-Wave Tube

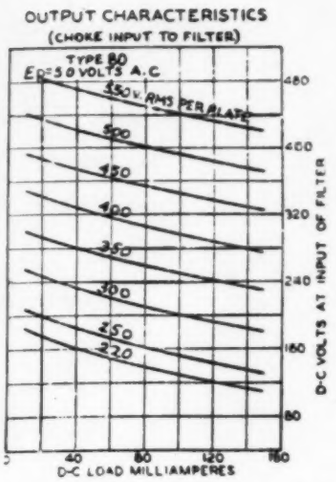

Fig. 17-A. — Characteristics of Type 80 Rectifier Tube — Choke Input to Filter

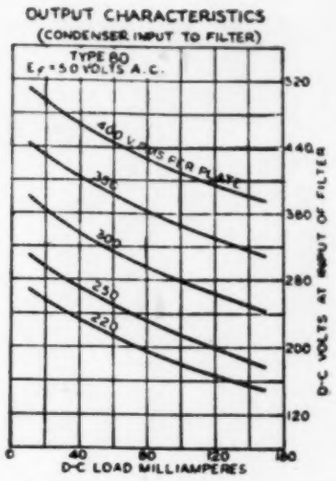

Fig. 17-B.—Characteristics of Type 80—With Condenser Input.

Inspection of the curves shown in Figure 17-B reveals a rather peculiar effect. This set of Characteristics represent the output voltage of the rectifier with a condenser input filter. We notice immediately that the slope of the curves is considerably steeper than those for the choke input. Consider again that we have 400 volts A.C. applied to the plates of the rectifier tube. Now when we draw a load of 20 m.a. from the rectifier, the D.C. output voltage is 500 volts. With a load current of 140 m.a. the output voltage of the rectifier will drop to 380 volts. This higher light load voltage and greater I.R. drop with heavier loads is due to the condenser input. We learn in our study of rectifiers that a condenser connected to the output of a rectifier charges up to the maximum value of the impressed voltage. The condenser stores the current during the peak voltage period and releases it during the lower voltage portion of the cycle. Higher voltage drop with load is brought about by the fact that the condenser is unable to maintain this high peak at large current drains on the rectifier.

Direction of Current Flow

IN considering the theory of vacuum tubes and other electronic devices, it is necessary to revise the usual conception we have of the direction in which current is assumed to flow in electrical circuits. For many years, it has always been assumed that **current flows from positive to negative;** that is, from the positive terminal of a battery through the external connected load and back to the negative terminal. In vacuum tube circuits, this would mean that the current would flow from plate to filament. The early scientists were responsible for this assumption regarding current flow. This original assumption was the result of necessity. In order to be able to follow and trace circuits and to explain circuit operation, it was desirable to treat current as a fluid or electrical force which travels from one point to another in the circuit.

Current Flow and Electron Flow Different

UNFORTUNATELY this original assumption does not "button up" with the actual known facts regarding electronic movement. In the preceding discussion, we have shown that electrons which carry a negative charge are attracted to the positively charged plate, hence, *they move from filament to plate* and, as we have just stated that current is assumed to flow from plate to filament; hence, there is a conflict. This may seem very confusing to the beginning student but actually it need not be. In explaining to ourselves and others the theory of a vacuum tube circuit or other electronic device, *it is well to think of electron movement* and not current movement. In other words, we should discuss and think of the electrons as moving from negative to positive. If, however, it is necessary to assign a definite *plus* and *negative* designation to terminals, particularly in dealing with batteries and items of this character, then we must use the old arbitrary designation; otherwise we will be in trouble. Figure

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Yes sir! QUIZZICUS will pay for all acceptable ideas that qualify for the feature right under this announcement. YOU have thought of many products—gadgets, etc., so here is your chance to earn a little money for your thoughts. Address your ideas to "Quizzicus," c/o TELEPHONE ENGINEER, 7720 Sheridan Road, Chicago, and if they "make" his feature you get $2.50 for each acceptable idea.

I WONDER WHY SOMEONE DOESN'T INVENT

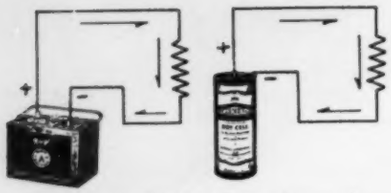
by Quizzicus

Coils sealed in gas pressure containers for use in humid climates.

A grade clamp which will prevent aerial cable from slipping and still be trouble free.

A metal wall niche to accomodate a telephone for installation in residences.

(Quizzicus is anxious to have YOUR suggestions on products that will make your job easier and improve the telephone art. Address your suggestion to Quizzicus c/o TELEPHONE ENGINEER.)



Arrows show direction of current movement.

Fig. 18.—Arbitrary Method of Designating Direction of Current Flow

18 shows the old arbitrary method of showing and thinking of current flow.

The Practical Conception

TO illustrate, suppose we wish to determine which is the negative and positive terminal on the half wave rectifier. Referring to Figure 19 showing a simple diode, assume we wish to determine which one of the two terminals is positive and which is negative. We know that the electrons flow from filament to plate and then through the load resistance back to the filament. If this is the case we then know that the current must flow through the load resistance in the opposite direction. We have shown this by means of two properly designated arrows. Inasmuch as current is assumed to flow from positive to negative and the current is flowing upward through the resistor; therefore, the positive and negative terminals would be as shown.

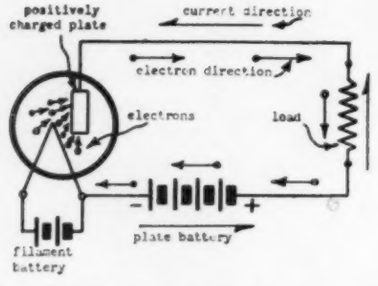


Fig. 19.—Current and Electron Movement in a Vacuum Tube

Mercury Vapor Two-Element Tube

ANOTHER type of two element tube or diode is one which contains a quantity of mercury vapor gas. These tubes are used for rectifying purposes and are capable of handling higher currents than the high vacuum type of rectifier just described. They are very similar in mechanical construction to the half and the full wave rectifier two element tubes just described. They operate, however, in a somewhat different manner. The chief difference in construction is the addition of a small amount of mercury vapor gas.

The operation of the mercury vapor type tube is as follows: With the filaments connected to a source of voltage, the temperature is raised and negative electrons are thrown off. If the plate has connected to it a high voltage it will, when positive, attract these negative electrons. In traveling from the cathode to the plate, the negatively charged electrons attain an extremely high velocity. Due to the presence of the mercury vapor gas in the tube some of the atoms of this gas will be found in the space between the cathode and plate. Many collisions, therefore, take place between the rapidly moving electrons and the mercury vapor atoms. Due to the high velocity of these moving electrons, there results what is known as *ionization by collision*. That is, the atoms of mercury vapor are *ionized* or electrified which results in additional electrons (called secondary electrons) being created. These extra electrons, having a negative charge, travel toward the plate together with the original electrons, thereby augmenting the total number of electrons reaching the plate. The practical effect of this action is to increase the current handling ability of a given size tube and at the same time reduce the tube's *internal resistance*.

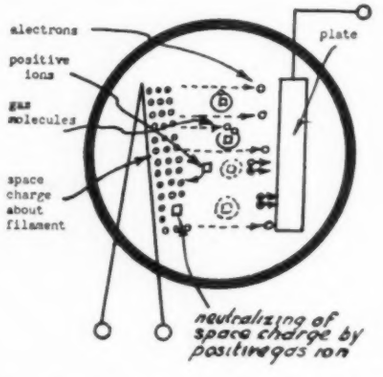


Fig. 20. — Action in a Mercury Vapor Tube

(Please turn to page 39)

Gray Company Marks Half Century of Progress

Telephone pay station manufacture originated with company established in 1891.

Walter E. Ditmars, President, Gray Mfg. Company.

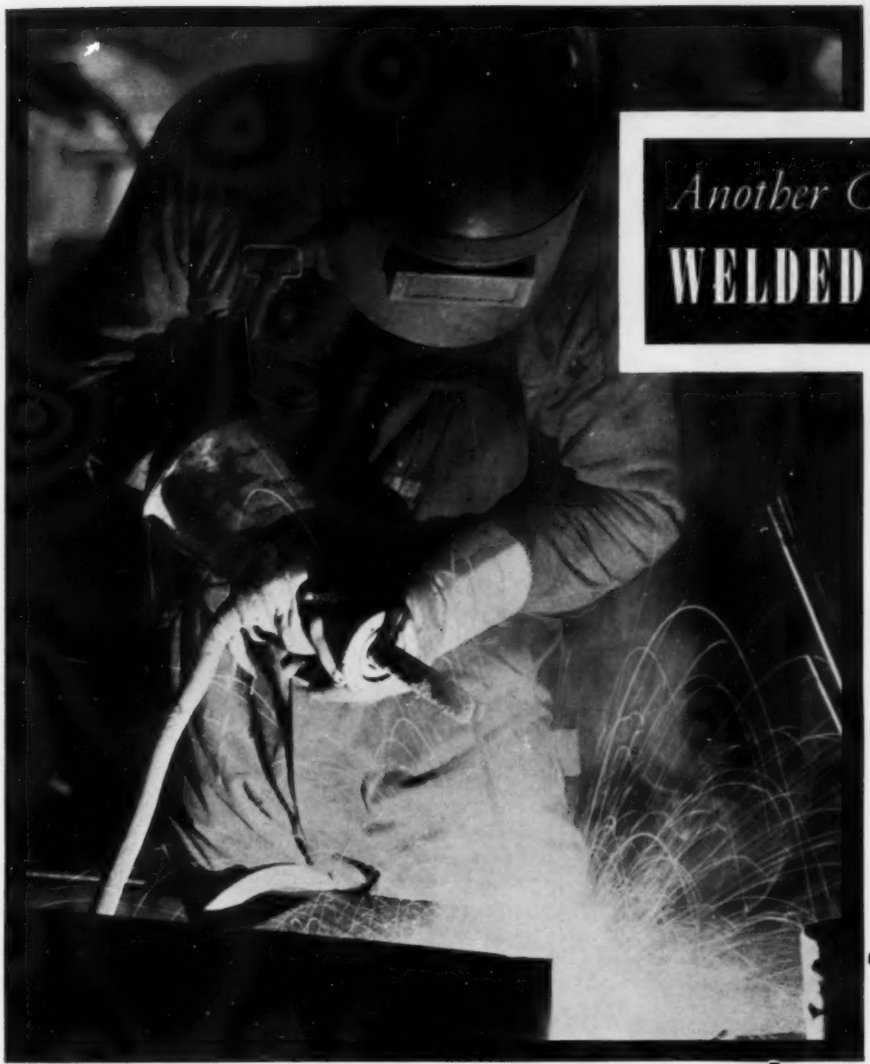
FIFTY years ago the infant telephone was a luxury reserved for business houses and private individuals of wealth. Occasionally, however, emergencies arose when the telephone became a necessity to even the poorest man and it was just such an occasion that led to the birth of the telephone pay station.

To William Gray the night of June 8, 1886 was a doubly important one for it marked the birth of a son as well as the birth of the idea that brought about the company that bears his name today. Frantically searching for a doctor to attend his wife he made several attempts to borrow a nearby business telephone before he succeeded in convincing the owners of the urgency of his call. With the birth of that baby was born the idea of a pay station and the telephone went democratic. Whenever we pay tribute to Alexander Graham Bell for his epoch making discovery we must also remember the man who placed that marvelous instrument at the service of even the poorest man or woman at any hour of the day or night.

From that time on William Gray devoted his energies to the development of a practical telephone pay station which would be the servant of anyone with a nickel in his pocket. On April 5, 1888 he filed application for the first of his twenty-three pay station patents which contributed so vitally to the success of the company which he founded three years later.

With the establishment of The Gray Telephone Pay Station Company, Gray discovered that his new product did

(Please turn to page 24)



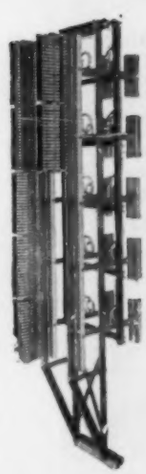
Another Cook Advancement

WELDED MAIN FRAMES

WELDING the nation's industry, commerce and armaments into a strong, fast-moving and efficient unit of defense is your task and ours.

In speeding this work to completion, the telephone lines of the country are playing a vital part. Helping the telephone industry maintain its safe, efficient service to both national defense and national progress are a long list of skilfully engineered and constructed Cook Electric Company products.

A recent Cook contribution is the Welded Steel No Sag Main Frame for central office protection and distribution. Three welding processes are used in the production of Cook equipment. Cook Products are distributed by all telephone manufacturers and supply houses.

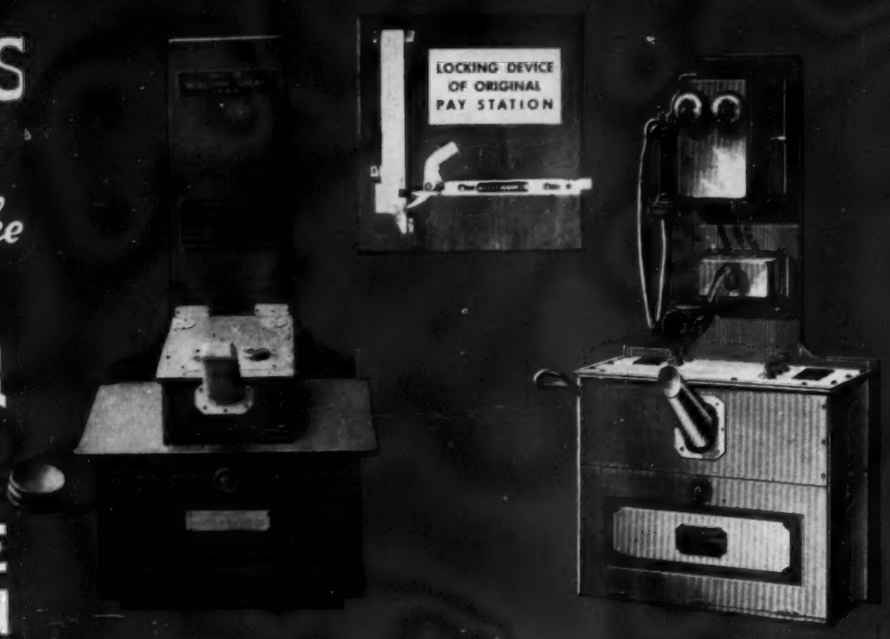


The new welded Type L Main Distributing Frame and Cable Distribution Rack provides suitable mounting for terminal blocks and protector groups. Designed and fabricated in rigid units to customer's specifications as part of Cook **planned protection** service, making for perfect alignment through years of service. Will not sag from excessive weight. Equipped with rubber insulated jumper rings, maple fanning strips and high quality, fine appearing terminal blocks. Has been supplied in units of 100 to 15,000 pairs for installations all over the world.

COOK ELECTRIC COMPANY

2700 SOUTHPORT AVENUE CHICAGO

50 YEARS OF PROGRESS *by the* PIONEER *of the* TELEPHONE PAY STATION



BERTRAM W. AINSWORTH, Executive Vice President, Gray Mfg. Company.

(Continued from page 22)

not find the immediate demand that he had expected. The telephone companies, the hotel and store owners, and the general public all had to be sold on the idea. Finding that sales could not be made outright the Gray Company installed them on a profit sharing contract basis wherever an agreement could be reached with the local operating company and the hotel or store owner. Many reasons were advanced why the new device would not be successful and would not be accepted by the public, but the final answer was the record of receipts. The Gray Company effectively argued that these receipts represented revenue which the telephone company would never receive without pay stations as the user would either borrow the use of a telephone or communicate some other way. The operating companies soon found it advantageous to buy the pay stations outright and the Gray Company got out of the operating end of the business and concentrated on manufacturing.

THE success of the Gray Telephone pay station has resulted primarily from sturdy simplicity of design and uncompromising quality. There are numerous instances of pay stations of forty years or more still giving satisfactory service and it is not uncommon for models of thirty years ago to be returned to the factory for repair. The records of the company show that well over a million pay stations have been manufactured and it is known that over seventy-five per cent of them are still giving satisfactory service.

Looking back over the years it is to be noted that the Gray Company has been unusually fortunate in attracting to it men of keen foresight and ability. Its inventions have dominated the industry for many years and its modern plant and equipment are second to none.

Today the company is in as favorable a position as at any time in its history. While capitalizing on the fruits of fifty years' experience the present progressive management is alert and has a keen eye to the future. Walter E. Ditmars, President, is a man of broad experience and is best known as the founder of the dry ice industry in this country. Following a brilliant army career during which he played an important part in industrial mobilization, he entered business and has since become well known in business and financial circles. His years of experience in charge of national distributing organizations is of marked value to the company.

Bertram W. Ainsworth, Executive Vice President, is an engineer thoroughly experienced in manufacturing.

He was formerly vice-president of the Brewster Corporation of New York and The Rolls Royce Company.

T. Frank Cassidy, Jr., recently appointed Telephone Sales Manager, is an engineer with a background of broad experience in the pay station field over a period of fifteen years.

Recently an important program has been undertaken with the object of improving customer service on telephone pay stations and making available complete data on all types and practical applications. One step was the signing of agency contracts exclusively with the following manufacturers and national distributors of telephone equipment:

American Automatic Electric Sales Company
Graybar Electric Company.
Kellogg Switchboard & Supply Company
Leich Sales Corporation
North Electric Manufacturing Company
Stromberg-Carlson Telephone Manufacturing Company

It is felt that the concentration of all sales through a selected group of agents will result in the development of a field force with full knowledge of pay stations and related problems and be of utmost service to the customer. Clarification and simplification of design are being undertaken in cooperation with the manufacturers of associated telephone equipment.

The Gray Company during the past few years has expanded its field of manufacture with the object of diversifying its products. It has exclusive manufacturing rights for the Anemostat, a draftless air diffusing device which is the leader in its field. Among the large markets for this equipment are the navy, air transportation, offices, factories and homes, or wherever air must be introduced without creating drafts. The use of such a device is most essential in connection with air conditioning systems.

T. FRANK CASSIDY, is Telephone Sales Manager of Gray Mfg. Company.

THE Gray Audograph, winner of the Design of the Month Award in September Electrical Manufacturing magazine, is an entirely new product incorporating radically new principles. It is an electrically operated recording machine which utilizes very thin, flexible, plastic discs. Its advantages include high quality of reproduction at low cost, permanent, unbreakable records and simplicity in design and operation. It has almost limitless applica- in all branches of the recording field. Up to the time of writing the Audograph has not been released for sale and will not be until it meets the high standards of durability and performance required in Gray devices.

With a half century of constant progress behind it and new fields opening up ahead, the Gray Company may look forward with confidence to a promising future.

A Half Century of Achievement

THE GRAY TELEPHONE PAY STATION

A CONSTANT SOURCE OF REVENUE
MODELS ARE AVAILABLE FOR ALL TYPES OF SERVICE

Discuss your requirements with one of our agents listed below:

- **AMERICAN AUTOMATIC ELECTRIC SALES COMPANY**
  GRAYBAR ELECTRIC COMPANY
  KELLOGG SWITCHBOARD & SUPPLY COMPANY
  LEICH SALES CORPORATION
  THE NORTH ELECTRIC MFG. COMPANY
  STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
- **CANADIAN TELEPHONES & SUPPLIES LIMITED**
  NORTHERN ELECTRIC CO., LIMITED

the **GRAY** MFG. CO.

Simple Applications of Economics in the Utility Field

By JAY G. MITCHELL

In this article the author strives to reduce Public Utility problems of management to their simplest terms — Predominant importance of revenue—Restatement of obvious factors—Availability of conservative methods in case of necessity—Nothing new under the Sun—Three elements of difficulty—Purchase of properties by bond issues secured solely by future revenues—Typical plant problem solved by application of economic methods—Revenues must always be given prime consideration—Modernization—Relative expense involved—Handicaps.

A PROMINENT and successful executive of the Public Utility industry with many years of constructive experience in his business background is reported to have said in casual conversation "The time to arrange for increased revenue is when you need the money." The most casual analysis of this terse pronouncement discloses that it is truly an acceptable basic description of that which, for lack of a more accurate term, may be designated as Applied Economics in the field of Public Utilities. It will be noted that the one contingency depended upon to justify an adjustment is the need of revenue. When additional revenue is needed there is probably implied either too large investment in the property for the amount of service sold, too high expenses or too few subscribers if the property in question happens to be a telephone system. In an electric light plant the only substantial difference is that customers or consumers is the term used instead of subscribers which term is inherited in the telephone business. At the risk of stating perfectly obvious facts it may be said that the remedy for too large investment in the property for the amount of service sold is to sell more service; for too high expenses is reduction of expenses and for too few subscribers is the connection of additional subscribers.

The solution of many of the problems resulting from the basic conditions mentioned, whether the system be large or small, involves the careful weighing of the factors from all points of view and this weighing of all factors has, rightly or wrongly, been designated Applied Economics. There is, of course, no intention of deprecating the many complete and excellent books that have Applied Economics for the title nor of attempting to unduly simplify a very complicated and difficult subject.

It is true that the application of economic methods, however, to the solution of executive problems in the field of Public Utilities is assuming a place of continuously increasing importance under present conditions. There are many reasons for this development, which it is inadvisable to attempt to trace at this time, and it can always be remembered that if other methods of approach are found to be required because of individual conditions in a given case conventional methods may always be invoked. No harm can be done by preliminary consideration along the newer lines of approach.

In the use of Applied Economics nothing really new is involved but when the matter is considered, whatever it may happen to be, all factors are correlated and coordinated. For illustration there is no novelty in the statement that every business enterprise is operated to make money for its owners. The capital is enlisted, the securities are issued and sold, the plant is built, the service is established, if the enterprise be a Public Utility, all for the purpose of selling a commodity which will produce more revenue than incurred expense thereby affording a return to the owners. When the return is absent or so small as to constitute less than a reasonable rate per annum on the Fair Value of the property something is wrong and the identification of the wrong thing and its remedy becomes an executive problem. Such a problem cannot always be solely a plant problem, a commercial puzzle, a potential rate adjustment or a matter of poor Public Relations; to mention a few of the ordinary classifications.

IT IS preferably treated as an overall problem and requires for its solution the combination of all the best thought available. To lose sight of **any** one factor may be to court failure. These statements lack something in the way of novelty but may serve to justify their inclusion here because of the possibility that some of the basic essentials of profitable management in the Public Utility industry, which after all is one form of business, may have become somewhat obscured by the rigid conditions under which the great amount of technical detail must, under present conditions, be utilized and developed.

It Pays Dividends

The classic modern design of the Crystopac telephone secures prompt acceptance from the magneto subscriber. It keeps him sold on telephone service.
It has full size ringer. It talks effectively. It has a simple vertical switchhook. It makes no trouble, but it *does pay dividends on low rentals.*

See Suttle Salesman Catalog for prices and details.

SUTTLE EQUIPMENT CO.
LAWRENCEVILLE, ILLINOIS

1314

IT'S ODD BUT TRUE

that 1314 is not only the street address of the Associated Telephone Company, Ltd., but is also the total station gain of that company during January 1941. It is also a record for any one monthly installation gain by that company. They now have in service 142,025 telephones.

Executive problems relating to rate adjustment, refinancing, purchase and sale, consolidation and reorganization and modernization, to mention only a few for illustration, should be solved by according primary consideration, in the author's opinion, to the annual net and the prospective net produced.

It is of interest to note, without any endorsement whatever of the idea, that Public Utility properties are now being sold and the funds to buy these properties are provided by bond issues **secured solely** by the future revenues of the property. If such transactions are found to be feasible in the long run a convincing step will have been taken to emphasize still more strongly the paramount importance of revenue as distinguished from plant and equipment in the consideration of the executive department.

SINCE this cannot hope to become a logical and consistent exposition of Applied Economics it will probably be well to outline an example or two of the application of these methods in the telephone industry.

The first illustration is one in which a deficiency in facilities, an apparent plant condition, was found to be solely an economic matter requiring very different remedies from those indicated in the beginning. Names and location will, of course, be omitted. In a telephone single office exchange served by modern equipment a marked shortage of cable facilities appeared. The plant department made a very careful and thorough study of the situation and reported that a reasonable view of the future as to service demands and of orders presently holding for cable repairs indicated the necessity of a large capital expenditure for additional cable. This study was based, of course, on the immediate past experience of the company in that exchange as to the growth in population, the construction of new houses and the other factors usually deemed to be worthy of consideration. Estimates for the additional facilities were prepared and embarked on their course through the departments toward executive approval. The project, while admittedly a plant matter, received commercial consideration and as a matter of commercial routine the classification of present subscribers in the exchange and the rate schedule in effect were scanned. Without any intention of doing so the matter was being analyzed from the economic standpoint.

It was noted that there was an unusually large proportion of the subscribers receiving individual line service. Now individual line service, requiring one cable pair per subscriber, reduces the average number of subscribers per cable pair that can normally be served in any exchange below the average number per cable pair that can be normally served when there is a normal proportion of party line subscribers. In other words this particular exchange was unable to meet the demands for new service, basically because of an unduly large proportion of individual line subscribers. The remedy was, of course, either the installation of additional cable facilities, the Central Office Equipment was ample in capacity, as the plant recommended or else **a more intensive use of existing facilities** by installing additional party line stations. While these were the ascertained facts the remedy remained unknown until the commercial department sent out service salesmen with instructions to sell **only party line service.** Their reports were to the effect that party line service in that exchange could not be sold because the difference in the rates for individual residence service and two party line service was so small that the prospective subscribers preferred to pay it and have individual line service rather than save it.

The problem was solved. The rate schedule must be adjusted so that the differential between individual and two party line service was increased and a small installation of additional cable facilities to care for conditions during the time the rates were being revised must be made. In this case revenues were, of course, involved and were bound to be affected. Any problem, however, connected with the management of a Public Utility should be carefully con-

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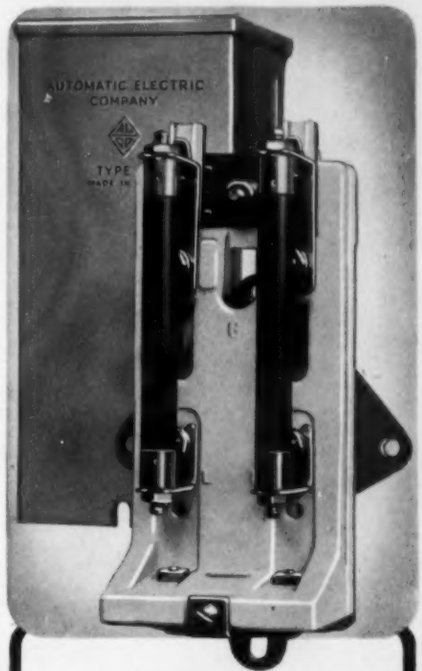
SANDS

SUBSTATION PROTECTOR



TYPE 15

for Indoors or Outdoors

Here is a new weather-proof design which provides better protection at lower cost on any type of line. It saves installation cost because its new "Four Point" bracket makes mounting easier. It pares maintenance expense, thanks to the Type 2105 discharge block, which resets itself after operation. Next time, order Type 15; it assures you complete protection.

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TELEPHONE, SIGNALING, AND COMMUNICATION APPARATUS

Distributors in U. S. and Possessions:
AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 West Van Buren Street, Chicago, U.S.A.

LINE and DESK

ADDRESS YOUR QUESTIONS TO LINE AND DESK EDITOR. NO CHARGE.

Q. We plan to make use of 1-pair cables for distribution and find that some subscribers object to having us make entrances into their basement as they fear that water may enter later. We have promised to seal all such cable entrances with cement and would be pleased to know whether a better method is possible?

A. Cement mortar will make a fairly tight joint although the free lime in the cement may cause corrosion trouble on the lead sheath of the cable. We would recommend that oakum be used to calk around the cable and the hole then be closed with an approved duct sealing compound. This compound will not only close the opening effectively but will not harden nor damage the cable sheath in any manner. It is most important that these basement cable entrances be properly sealed against the entrance of water later.

Q. For a number of years we have used outside type of unprotected cable terminals for installation inside of buildings when the number of telephones in one location will justify this type of construction. Now we are having difficulty due to the fact that the terminal boxes provided in modern buildings are not large enough to mount this type terminal. Please advise what terminal you would recommend for this purpose?

A. We would not ordinarily recommend the use of an outside type terminal for use inside a building. They are not only large but are also expensive for this purpose. We would recommend the use of small sealed chamber type terminals. Extra long cable stubs may be used or the sealed chamber may be made up on the lateral cable itself. Sealed chamber terminals may now be obtained in various sizes and shapes to meet almost any special condition.

Q. Please advise us whether it will be possible to connect two self-regulated rectifiers in parallel to charge a telephone battery?

A. There is really no need for this parallel connection as a relay arrangement can be used to switch one constant current and one self-regulated rectifier in parallel. These machines must be of equal capacity. The self-regulated type carries the load until the discharge rate exceeds the capacity of one machine when the control relay operates and cuts in the constant current machine. The self-regulated rectifier will then carry the discharge fluctuating load above the constant current machine capacity. This method will give self-regulation over the full capacity of both machines and at a much lower cost than two self-regulated rectifiers.

Q. We have a large number of the old style cable rings which are attached to the messenger with a pair of crimping pliers. Will it prove satisfactory for us to make use of these rings or should we purchase the more modern type?

A. In our opinion it will prove decidedly more economical to buy new rings and dispose of the old ones which are of an obsolete design. Crimping pliers would not attach these rings to a messenger with enough tension to hold them without slipping and they would usually bunch up later. Also the old cameron ring was not as smooth on the inside as are the new rings and they made more contact with the cable which presented a hazard due to the collection of dust which caused frequent ring cuts from the swaying of the messenger. Without a doubt the new ring is far superior to the older type and as their cost is reasonable we feel that in your case the purchase of a new supply will prove a real economy.

Q. We have considerable difficulty drilling holes in plaster tile walls with an ordinary star drill. Can you tell us how this difficulty may be avoided?

A. We suggest that you make use of the rotary masonry drills which are now available and may be used to advantage on all such work. These drills cut with about the same speed as the star drills and hammer method and make a neat job possible. A drill of this type is considered necessary to avoid marring smooth finished walls.

Q. Please advise us what precautions may be taken to avoid dropping tools from an aerial cable splicers platform?

A. We would suggest that all small tools be kept in a canvas tool bag or bucket hung on the messenger at one end of the platform. Some prefer to keep all small tools in a box on the platform though this is not entirely desirable as the box may be knocked off the platform and injure persons passing nearby.

Q. When suitable gas is not available for the testing of cable will it be satisfactory to make use of ordinary compressed air for this purpose?

A. Compressed air always contains moisture and its removal will in most cases prove more expensive than the purchase of Nitrogen gas which is not itself expensive. Also gas is always safe and when air is used one cannot be absolutely sure that all moisture has been removed unless complicated tests are used.

Q. When building an aerial line with high tensile strength wire and extra long spans how will we determine how much sag to leave in the spans?

A. Proper stringing sags in table form for use with the various types of wire may be obtained direct from the manufacturer. It is most important that this type of wire be strung to the proper tension and that the correct amount of sag be left in each span according to the sleet loading of your locality.

Q. We have in the past experienced considerable trouble due to ring cuts near the poles on aerial cable construction. Will you advise how this defect may be avoided on future cable jobs?

A. First it is most important that the supporting messenger be placed at the proper tension. This may be accomplished by using a dynamometer or the oscillating test method. Special rings or saddles should then be used at each pole. These special rings prove quite effective and may be purchased at a reasonable cost.

Q. We understand that the buried type wire has proved entirely unsatisfactory for telephone use. Is this a fact?

A. While it is true that buried wire has caused considerable trouble in some localities it has likewise proved highly successful in others. This wire has been improved considerably of late and several telephone companies are now making large installations which it is believed will prove satisfactory. We will no doubt see much more of this type construction in the future.

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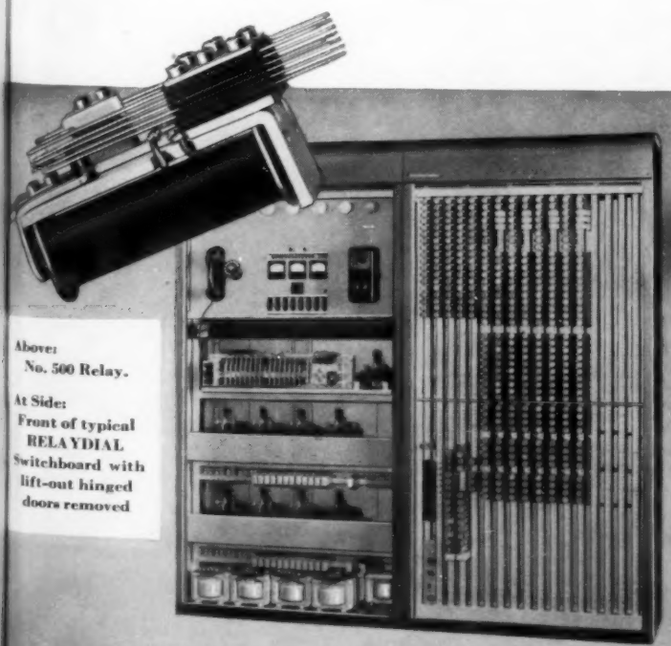
After exhaustive studies of exchange requirements, subscriber needs, and apparatus types, Stromberg-Carlson offers dial-operated systems of advanced design, reliable in operation, and economical in maintenance.

Equipment is available for: City and Town Central Offices; Private Branch Exchanges; Isolated Community Exchanges; Inter-Connected Community Exchanges, and Satellites for Larger Exchanges.

Streamlined to meet modern trends, these systems function with non-marginal circuits, employ specially designed relays to insure trouble-free operation, are wired with simplified cabling, are arranged to avoid dust accumulations on spring contacts, and are housed in accessible steel cabinets which guard against mechanical injury and fire hazards.

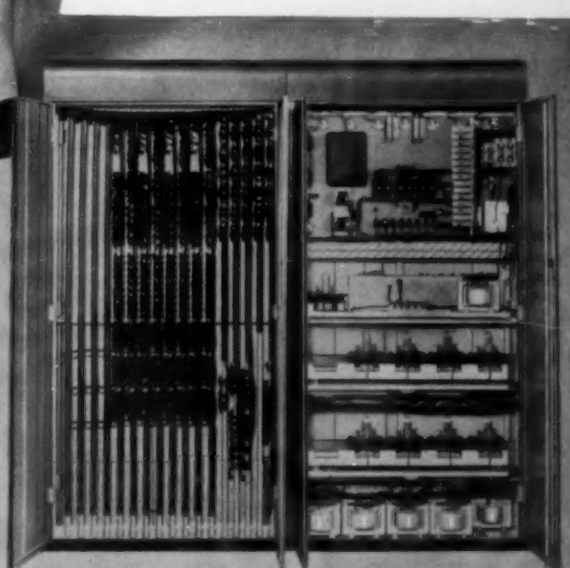
Our Engineering Department will be glad to furnish detailed data to meet your particular requirements.

Reliability distinguishes the No. 500 Relay which is used for circuit switching. This is largely accomplished through simplicity of design. The Relay is equipped with single-unit frame and core; one-piece armature; one-unit spring assembly; self-contained type coil and precious metal twin contact armature springs, having positive "follow" and "wipe" action against fixed back and front contacts.



Above:
No. 500 Relay.

At Side:
Front of typical RELAYDIAL Switchboard with lift-out hinged doors removed

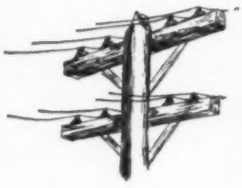


Rear of typical RELAYDIAL Switchboard with lift-out hinged doors swung open

Dimensions
Double Cabinet:
Length: 6′ 8 1/8″
Height Overall:
6′ 9 1/4″
Depth: 13 3/8″

Stromberg-Carlson Telephone Mfg. Co., Factory and General Offices: 100 Carlson Road, Rochester, N. Y., U. S. A. Branch Offices: Chicago, Kansas City, San Francisco, Toronto

LONG LINES



R. A. Clark, Jr.

A Simple Method for Locating Crosses and Grounds

It is recognized that the loop and varley method is the most accurate one for locating crosses and grounds on open wire and cable circuits, however wheatstone bridges are not available at all test points and a simple method employing voltmeters and a milliammeter may be used with fairly good results, providing the installation resistance is reasonably high. Instruments required consist of a battery source and a variable resistance of approximately 2,000 ohms for controlling the battery current, a voltmeter and milliammeter at one end. At the other end only a voltmeter is required.

Fig. 1 shows the elementary circuit principles; where an isolated battery is available this test circuit can be used in locating a cross on a pair of telephone wires. The testing procedure is as follows. Connect the battery to the crossed wires as shown in Fig. 1 and adjust the variable resistance until a good reading on the milliammeter is obtained. If possible a current of at least 100 mils should be used. Read the voltage at the battery test point (V_1) and the voltage at the distant test point (Vs). Vs indicates the resistance of the cross which in many cases will be substantially zero. Solving by means of Ohms law which states that the resistance is equal to the voltage divided by the current, we can obtain the resistance at the battery test point. Likewise, from the current flow and the voltage reading Vs we can determine the resistance of the cross. Subtracting the resistance of the cross from the total resistance gives us the resistance of the line out to the short circuit. Knowing the loop resistance of the wire per mile we can readily determine the distance out to the cross. Where sections of cable are interposed in the circuit it is of course necessary to take this into account. Resistance measurements made to known points along the line are of considerable value especially where there are a number of cable sections involved.

The principles involved in locating a ground are similar to that described above; the circuit is shown in Fig. 2. In some instances a residual potential exists on the line. This can be determined by grounding the wire at the battery end and reading Vg. Any residual voltage should be taken into account in computing the voltage drop along the line. In general, it is not sufficient to effect the calculation appreciably.

Where a cross exists between two wires having different resistance values, the testing procedure is a little more difficult, however the solution can be obtained following the same procedure as outlined above. In this case, a circuit should be set up as shown in Fig. 3 and three voltage measurements made at the distant end as shown. V_2g and the current reading can be used to determine the resistance of wire 2. Vs and the current reading determine the resistance of the cross. V_1g subtracted from the total voltage V_1 is the voltage drop across the line wire No. 1. V_1g should equal the sum of Vs and V_2g. It is good practice to repeat the tests with the line wires reversed thus checking the

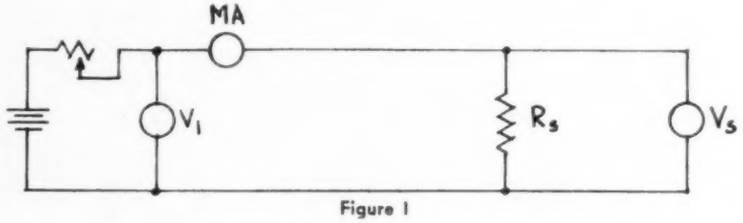


Figure 1

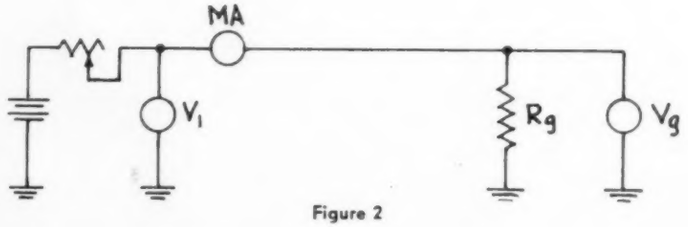


Figure 2

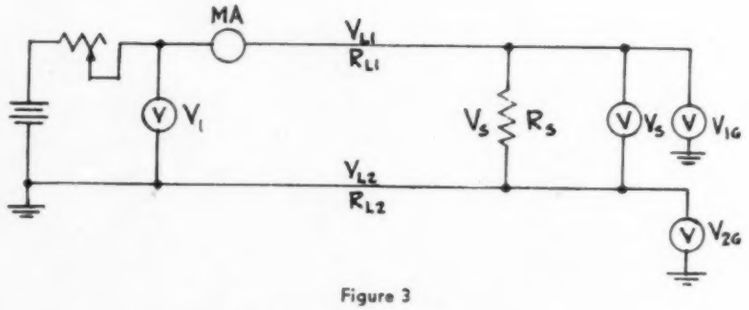


Figure 3

accuracy of the measurements.

While the accuracy of the method described above will not in any way compare to that of bridge measurements it is simple and can often be made by the time a lineman is found to start after the trouble. It should be possible to locate crosses within 5 miles if care is used in making the measurements. This will often save considerable delay in clearing the trouble.

(END)

Texas Association Will Meet "Where the West Begins"

A true harbinger of approaching spring is the annual announcement of completed plans of the annual Texas Telephone Association convention. Last year they met in San Antonio amid much local color and fiesta-like atmosphere. Ft. Worth, "Cowtown" to most Texans, will be the city for the 1941 meeting on March 19, 20 and 21. This announcement comes from George Butler, the likable and able secretary of the Association with the notification that complete program will follow in a few days.

The meeting this year will bring the association back to Ft. Worth for the first time in many years. The door to the "cow-country" is known for its hospitality together with its metropolitan hotels. The annual Worlds Champion Rodeo and Fat Stock Show is scheduled for March and those attending the conventions will be treated to much western "color" during their visit. We remember the many conventions we attended at Ft. Worth in years past as it is our former home so we urge every Texan to attend as Oscar Burton, the Association president, and Mr. Butler always have one of the outstanding conventions of the year. In notifying us of the meeting George Butler told the writer that "since you spent the first 100 years of our life in Ft. Worth, and married a Ft. Worth girl, possibly you can describe the convention city better than I."

Applies for Indiana Toll Facilities

Because of the mushroom growth in recent weeks of Charlestown, Ind., from a population of 900 to 20,000 due to its new munitions plant, the FCC is now considering an application of the Indiana Bell for construction of toll facilities to cost $400,000 to serve the defense activities of that community.

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BOTH SIDES COME TO GraybaR

In the choice of wooden poles, GRAYBAR has recognized that differing conditions lead to different preferences. For *both* cedar and pine poles, however, leading utility and telephone companies have chosen GRAYBAR as an exclusive source of supply. When they order "via GRAYBAR", they get a double assurance of good value: (1) Top-quality lines of leading suppliers, (2) backed by the extra satisfaction insurance of the GRAYBAR tag.

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Choice of air-conditioned rooms and suites—tub, shower and circulating ice water in every room.

$2 PER DAY at the WORTH HOTEL

FORT WORTH

Highlights of the Communication News

(Continued from page 16)

tative draft of general basic accounting regulations for a continuing property record. It is expected that the FCC will submit these regulations to the Committee at its next meeting probably within six weeks.

While the NARUC Committee leadership distinctly indicated to TELEPHONE ENGINEER that it was favorable to the proposed segregation, it was felt by the Federal and state commission accounting experts that the division could be postponed for definite determination "at a proper figure when, as and if a need for this step arises." The Committee would probably favor a lower segregation figure than the $8,000,000 level—this was authoritatively indicated. It was understood the commission representatives held the view that a dividing line around $2,000,000 would be more appropriate to segregate the small and large telephone companies for regulatory accounting purposes.

The specific situation when this segregation plan can be considered would occur, according to the views of the NARUC Committee, in the event of the promulgation of continuing property record regulations or depreciation accounting requirements. Then it would be appropriate for the Independent industry, probably through the USITA Accounting Committee, to present its contentions and views on the projected segregation. Based on past similar surveys of accounting revisions the FCC would conduct for the NARUC Accounting Committee a conference with the leading accountants of the Bell System and Independent industry and out of such a meeting could be evolved modified requirements for the smaller telephone companies.

If the present plan of determining this projected division of Class A companies materializes through the promulgation of the continuing property record, the NARUC accounting body will be able to present recommendations for this segregation at the next convention of the National Association of Railroad and Utilities Commissioners to be held at St. Paul, Minn., in June so that the proposal would receive the formal authorization of the regulatory bodies. It will be recalled that Fred Kleinman, NARUC Accounting Committee Chairman and Illinois Commerce Commission Chief Accountant, presented a report at the Miami convention of the Association last December which urged that organization to approve the segregation at a suggested figure of around $8,000,000 revenues.

Washington Developments

MAJOR General Joseph O. Mauborgne, Chief Signal Officer of the Army, in a recent radio address characterized the communications system of the United States as adequate to achieve the ideal of instantaneous communication for the military forces which is the main nerve structure of the modern Army. General Mauborgne expressed the view that the utmost use of commercial communications systems, particularly the telephone industry, under private operation would be maintained as far as possible in all but the actual fighting zones. He cited that the Army uses telephony in all its forms and expressed satisfaction with the telephone system in establishing air raid warning services for civilian defense. Out of every million soldiers in the

(Please turn to page 34)

A STANDBY WITH PUBLIC UTILITIES

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Kerosene or Gasoline

5 Types— Flat and Round Tank Models

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No. 3

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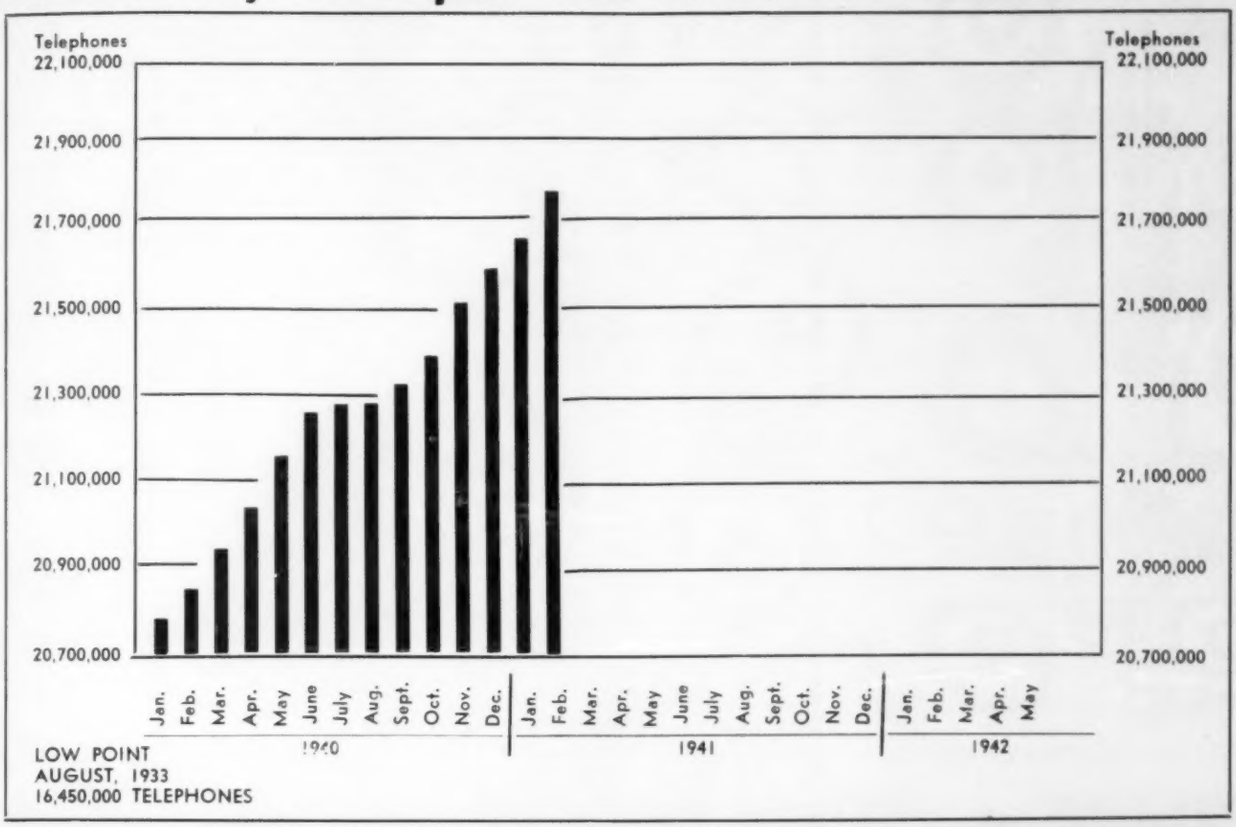
Monthly Telephone Station Barometer



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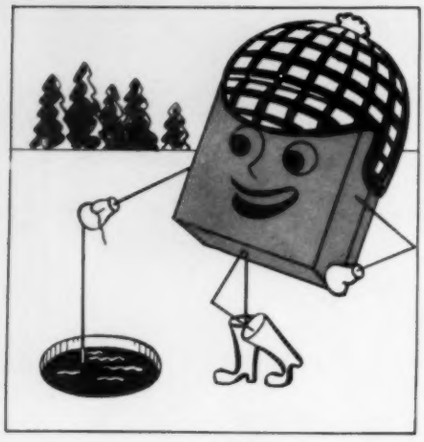

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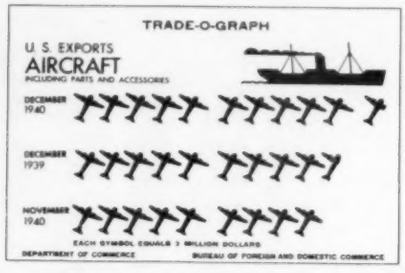
Army General Mauborgne noted that 60,000 are required for the operation and maintenance of communication services.



Large FCC Appropriation

THE FCC had its 1942 fiscal year appropriation—practically double its current fund—approved by the House without change and now its budget is up for consideration before the Senate. The FCC was allotted $2,315,229 for its normal regulatory functions and $1,920,000 for national defense activities. Under its 1942 appropriation for regulatory activities, the FCC will continue its special staff on expanded telephone regulation and will be able to establish two more field accounting offices to survey the financial records of telephone companies. The national defense activities of the Commission are mainly for monitoring of radio stations, but the $1,920,000 fund permits the establishment of a small special staff to plan and study telephone regulation under war conditions with the experience of the first World War as the main background for this research.

Harrison Doing Big Job

ONE of the best known executives in the telephone industry, William H. Harrison, Vice President and Chief Engineer of the American Telephone and Telegraph Co., is occupying an extremely important "key" position in the defense preparedness organization in Washington. Mr. Harrison under the new OPM has been assigned the most responsible job of handling production in three major fields—he will be the Chief Executive in charge of production for shipbuilding, construction of Army and Navy establishments and airfields and munitions plants and supplies for the Army and Navy such as quartermaster, chemical warfare and signal service equipment and needs. For the past seven months, while on leave from his A. T. & T. position, Mr. Harrison has been directing the construction program of the Army and Navy for the National Defense Advisory Commission for William A. Knudsen, now OPM Director. In this construction work, the A. T. & T. executive achieved a notable record of accomplishment in keeping pace with the Army and Navy mobilization programs and in creating scores of new munitions plants. It was notable that in the construction activity telephone service requirements were always far out in front, exhibiting the advance engineering and planning of that industry to meet defense demands.

Commends Industry

The Army commanders during the recent New York-New England test of a civilian warning system to guard against enemy air raids of four days' duration praised the telephone service and personnel in the highest terms as having been the principal medium for making these demonstrations successful. One high Army officer stated that the tests showed the American telephone system was by far the best in the world. The praise came from Lt. General Hugh A. Drum, commanding the First Army, and Major General James E. Chaney, who heads the Army Air Defense Command for the entire nation.

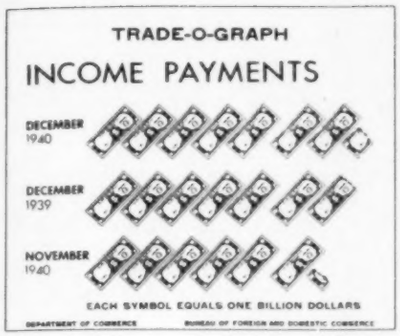
Legislation

THE Congressional outlook on communications legislation is barren. During mid-February the House Judiciary Committee held hearings on two measures which would permit the Justice Department and the FBI to engage in telephone wire-tapping to apprehend major crimes and to prevent espionage and subversive activities. Both bills (by Reps. Hobbs of Ala. and Walter of Pa., Democrats) would require authorization by a high ranking Justice Department official or a Federal Judge before wiretapping could be undertaken. There seems little likelihood of the proponents of a FCC-broadcasting investigation either in the Senate or the House receiving approval for such an inquiry as Congress is completely wrapped up with defense matters.

Rates

THE FCC has recently handed down its first formal rate order—its decision instructing the Pacific Telephone and Telegraph Co. to make its interstate toll rates conform to the lower level of charges of the American Telephone and Telegraph Long Lines Department. While the actual amount of the reduction was small—$300,000 a year—the FCC's decision was important because it promulgated formally the Federal commission's policies and views on unreasonable rates, discrimination and prejudice and the rate of return for the telephone industry, especially the Bell System.

The most important pronouncements in the FCC decision dealt with its rejection of the contentions that Interstate Commerce Commission decisions on railroad rates should control telephone rate regulation of the Communi-

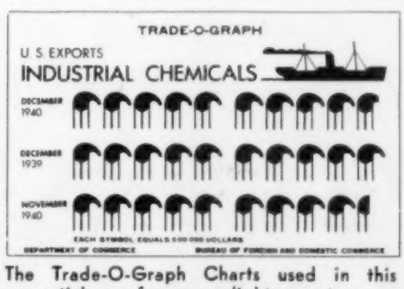


cations Commission and the construction of Section 202(a) of the Communications Act. Stressing the great differences between railroad rates and telephone charges and service, the FCC order declared that if the former ICC "decisions are binding upon this Commission (FCC) in its administration of the Communications Act, it is very doubtful whether this Commission could ever establish the existence of unlawful discrimination or preference *** this Commission should conform its decisions to the broad purposes expressed in the Communications Act ***. We must, therefore, give due consideration not only to the differences between the laws *** but also to the essential differences between the two industries.

"There is no doubt that users of telephone service are entitled to equality of charges for the same or equivalent service without a showing of competitive injury ***. Absolute equality, the ideal standard, may vary or surrender on occasion to other compelling considerations. But in the absence of other controlling considerations the basic rule to be observed in the determination of reasonable charges is that there shall be collected from each user 'equal charges for equal services.'"

In its report the FCC definitely indicated its viewpoint that the telephone industry, especially the Bell System, did not need as high a rate of return as six per cent because its risks of business were not hazardous. Whether the FCC is likely to delve later in a more specific manner into the rate of return is not known, but in this decision it definitely declared its position in favoring a rate of return below 6%. "When it is considered," the FCC stated, "that the Bell System Companies probably have no risks not common to the country as a whole, and when comparison is made with the interest yield on United States Government Bonds, a fair rate of return for the Pacific System is certainly substantially less" than the rates of 5.97% for 1938 and 6.5% for the eleven months of 1939 which were brought out in the record of this proceeding. This trend of viewing the Bell System rate of return as able to stand a lower yield has occurred in some state commission decisions, notably the recent state-wide rate reduction order of the Washington State Department of Public Service. But other state commissions are now indicating an attitude that the extraordinary expenditures and costs arising out of the national defense emergency place a burden on telephone companies and drastic regulatory views should be held in abeyance until the emergency has passed.

A most interesting portion of the FCC report was its "board-to-board" and "station-to-station" separation analysis. This position of the FCC was summarized in its opinion as follows: "The separation study submitted in this proceeding was made on *** the 'board-to-board' basis. *** If *** recast on the 'station-to-station' basis, the expenses *** must be increased to reflect the local service expense *** it is an unavoidable conclusion that, on a 'station-to-station' basis, the company's system of allocation would show the two classes of interstate toll service in question to be furnished at a loss. This is further proof that the separation study basis is either unsound or so inaccurate as to destroy any probative value thereof."



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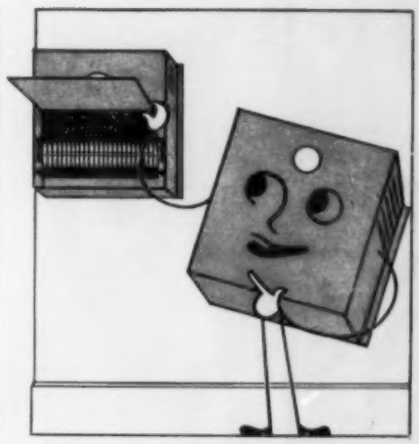

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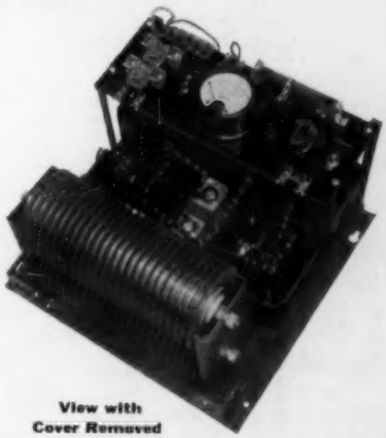
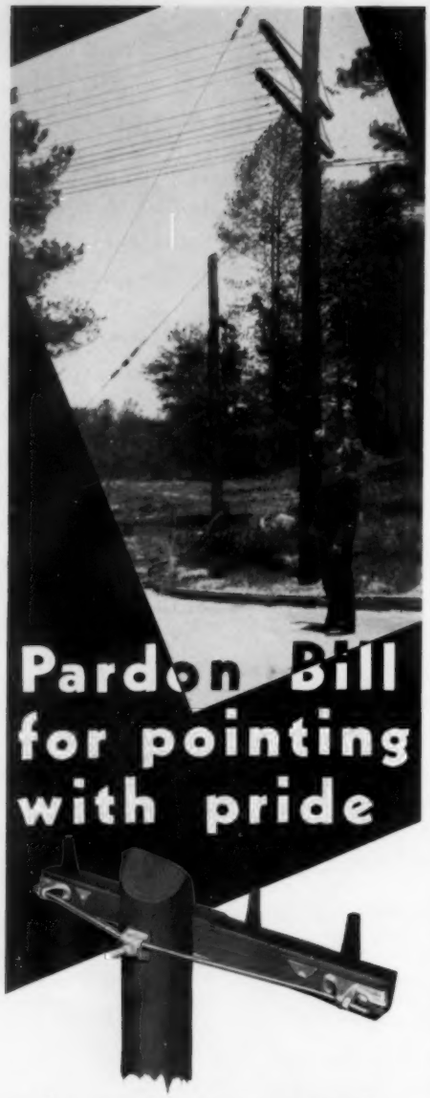


View with Cover Removed

A RectiChargeR with a small storage battery floating across its terminals makes a complete, automatic, AC-DC constant-voltage telephone power unit. Components are long-lived, maintenance-free. Consult your usual source of telephone supplies for the correct RectiChargeR for your needs. Write for bulletin DL 48—263 ATE.

RAYTHEON MANUFACTURING CO.
134 WILLOW STREET, WALTHAM, MASS.



The Chance Back Truss makes a neat and sturdy dead end support

Bill Moss is justified in his admiration of the sturdy Chance Back Truss, for it not only makes an attractive dead-ending job but also adds many years to the life of the cross arm.

Down in Bill's territory there are a lot of companies using this type of back brace because it is so easily intalled, compared to the old angle arm method and because it can be tightened after it is mounted on the pole.

"We save three quarters of an hour on each installation by using the Chance Back Truss," one enthusiast reports, "and we get a better, more dependable job."

CONSULT YOUR CHANCE CATALOG

A·B·CHANCE CO. CENTRALIA MISSOURI

Simple Application of Economics in the Utility Field

(Continued from page 27)

sidered as to the effect of tentative solutions upon revenues. The demand for individual residence service, in the case outlined, was abnormally great and necessitated the allocation of too many cable pairs in comparison with normal conditions. There was no question as to the relative desirability of party line service and individual line service.

Careful study of the situation, was of course, required because the object which it was found must be accomplished was primarily to bring about a shift of subscribers from individual line service to party line service **to conserve cable facilities.** Incidentally the amount of the revenues could not be reduced in the aggregate but this was not the primary consideration because the installation as planned of a large amount of cable would impose, by itself, the necessity of increased revenue if the rate of return were maintained at a normal figure. In the end it was found that the adjustment of the rate schedule made party line service more salable and the rate of return was satisfactorily maintained.

Another type of situation is so common as to require no especial localization. This is the situation of the small exchange which it is almost if not absolutely impossible to keep out of the red by the usual methods. The equipment may be of the best quality and well maintained. It is usually, in such cases, of an old type, however, but may well be in perfect operating condition. Examination of the income statement indicates that additional revenue must be forthcoming regardless of the excellence of the management and the fine operating condition of the plant and equipment. An increase in rates may be in order but only if the rates in effect are extremely conservative in comparison with other exchanges of similar size and type. The remedy for this situation is now well known although it is the considered opinion of the author that it was discovered by chance rather than thought out.

The condition may be analysed about like this. The telephone using public, which formerly stayed pretty close to the home town, now travels from city to city and from exchange to exchange. The development of automobile transportation insures that many of the residents of each town visit other, and in many cases, larger centers very often. On such contacts with other and larger communities it is certain that they will somewhere encounter telephone service of a modern type. Without formally doing so each traveller will set up in his mind an ideal of acceptable telephone service in comparison with which the service back home is often bound to suffer. Very likely nothing is said at home about the more desirable service available elsewhere but the mental concept of good modern service is retained.

NOW the management of the small exchange, if it is aware of the situation, may decide to retire the old fashioned equipment which has done such good service and install equipment which will make high grade modern service possible. In numberless cases the announcement of the proposed modernization of the service is received by the public with an enthusiastic demand for additional service bringing about, as a result, an improvement in the gross revenue of the exchange. It may be argued that the consideration of all these factors in the executive management of a telephone exchange is not Economics that it is merely the combination of good traffic management, good plant practice, good public relations and the full realization that the Public Utility is reaching out for a competitive dollar.

No exception can be taken to this position provided it is accepted as a workable method that all the factors which can directly or remotely affect the revenues are given consideration and when that is done a convenient term for the process is Applied Economics. Possibly this may be an approach to an argument in favor of eliminating specialization in Public Utility management but if so the discussion of that can well be left for some other occasion. Present conditions involve the use of a complicated mechanism, the Public Utility, for the production of revenue and like other complicated mechanisms it requires the best brains of all departments to arrive at an answer when these problems arise.

For illustration, it has only been within a comparatively short period that experience has demonstrated the increase in revenues in small telephone exchanges which follows the modernization of the service. Arithmetically it may appear to be unreasonable to expect that the additional capital outlay

25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of February, 1916

A TWO DAY convention of the Minnesota Independent Telephone Association was staged at the West Hotel, Minneapolis, January 25, 1916. More than two hundred delegates were in attendance which was the greatest representation in the history of the association.

▲

The Indians living near the celebrated Mesa Verde in southwestern Colorado were against the telephone lines the government had completed, twenty-five years ago, extending through the Mesa Verde National Park. They declared that 'the poles wouldn't stand' and that 'the wires wouldn't talk.

▲

Harold La Chapelle, formerly of Glenwood, Iowa, was one of the ten men to receive a silver loving cup from the American Telephone & Telegraph Company, with whom he was connected in Denver, Colorado, as a token of appreciation for help on the transcontinental demonstration that was held December 2, 1915.

▲

Motion pictures of the construction of the cross-continent telephone line were shown at the Chamber of Commerce at Syracuse, New York, twenty-five years ago today, in connection with a novel telephone "stunt." While the guests were watching, through the medium of the movies, they heard the actual roar of the breakers of the Pacific Ocean through special receivers with which each guest was equipped. This was done with the aid of a huge sounding board which was erected on the shore near San Francisco and was connected directly with the hall at Syracuse.

▲

The Executive Committee of the United States Independent Telephone Association held its first meeting at the Hotel LaSalle, Chicago, January 8, 1916. President C. Y. McVey proved that the telephone business was the fourth industry of the United States and said he believed that some day it would be the first.

▲

The Norwegian government, which owns and operates all telephones in Norway, twenty-five years ago today, prepared plans and specifications for the first dial exchange in Norway. The cost was estimated at $268,000.

in such cases will be justified **without any increase in rates** by increased revenue. In some cases of course, the expected result may not be realized. When this occurs it is almost certain that there were some controlling conditions which were not fully considered. Such adverse experiences cannot be assumed to prove that the economic method, rather than the rate of adjustment method may not, in many cases, offer the solution of many problems to the harassed executive.

In conclusion it may be said that when economic methods are effective the expense involved in revenue improvement, for illustration, is less than the expense involved in the application of the old specialized procedures. It is also true that such methods are free from the handicaps that are sometimes associated with long established practices because their application calls for a mental attitude free from prejudice and conventionality.

H. M. Engh Named to Lead Pennsylvanians

Harry M. Engh, president of the Pennsylvania Telephone Corp., Erie, Penn., was named president of the Pennsylvania Independent Telephone Association for 1941. according to an Association announcement dated Feb. 10.

J. F. Stockwell, exec. vice president, Keystone Telo. Co. of Philadelphia, and K. B. Schotte. gen mgr. Kittanning Telo. Co., were selected as vice presidents. G. B. Rudy, Jr., President, York (Pa.) Tel. & Tel. Co., will serve as treasurer. H. M. Stewart. their well known Executive secretary was re-elected as was the secretary, M. E. Cunningham.

Directors named are: C. E. Bennett, president, Tioga county Bell Tel. Co., Wellsboro; A. O. Black, general manager, Peoples Tel. Corp., Butler; C. E. Eaby, general manager, Denver & Ephrata Tel. & Tel. Co., Ephrata; H. R. Miller, president, Bethel & Mt. Etna Tel. & Tel. Co., Myerstown; A. E. Brown, secretary, Springfield Tel. Co., West Springfield; W. W. Shoop, secretary, Vandergrift (Pa.) Telephone Co., and John H. Wright, Jamestown, N. Y.

General Shows Increase

General Telephone Corporation reports for its subsidiaries a gain of 3,520 company-owned telephones for the month of January, 1941, as compared with a gain of 2,388 telephones for the month of January, 1940. The subsidiaries now have in operation 535,531 company-owned telephones.

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C. O. Field Selected As Chief Engineer

Announcement has just been made by R. A. Phillips, vice president and general manager of the Central Electric & Telephone Co., Sioux City, Ia., of the selection of Mr. C. O. Field as chief telephone engineer, with offices in Sioux City.

Carl O. Field has been selected by the CENTRAL ELEC. & TELEPHONE CO., Sioux City, Ia., as their Chief Engineer, succeeding H. T. Murray.

This selection was made when Mr. H. T. Murray, the former chief engineer, resigned to accept a position with the Army as civilian telephone engineer at the 7th Corps Area in Omaha, Neb. Mr. Field has been the district manager of the Central Elec. & Tel. Co. in three states—Virginia, West Virginia and No. Carolina.

C. C. Ward, group manager of the Charlottesville group, a part of the Virginia Tel. & Tel. Co., has been promoted to district manager having supervision of all the Company's property in the states of Virginia and West Virginia. Mr. J. P. Borden, previously plant manager of the Charlottesville group, has been named as group manager for the exchanges of Charlottesville, Standardville, Scottsville and Palmyra, Virginia.

Missouri Exchanges Sale Set for Hearing

Hearings were to be heard by the Public Service Commission of Missouri on February 11 on the applications of P. Kerr Higgins d/b/a Fidelity Telephone Exchanges to sell and Clifford T. Davis and Katherine J. Davis to purchase the telephone exchanges at Sullivan, New Haven and Owensville, Mo.; and for sale to the Ozark Central Telephone Co. of the exchange at Pacific, Mo.

Mr. Higgins is one of the old pioneer Independents that is well known all over the country. He was prevented attending the last National convention in Chicago because of serious illness.

Gain in Employment, Wages and Rate of Pay

During October the telephone and telegraph industries registered an increased aggregate weekly payroll and the number of hours worked per week, hourly earnings and the average weekly wage above the previous month, according to the monthly bulletin just released by the U. S. Department of Labor.

With a weekly payroll of $12,983,000, the communications industry showed an increase of 1.1% over September and a rise of 5.9% above October a year ago. Working 40 hours weekly, the telephone and telegraph employees averaged 0.3% above the previous month's total and 0.2% higher than Oct., 1939. The workers earned 81 cents an hour an increase of 0.9% over September and 1.1% above the same 1939 month. Their weekly earnings totaled $32.05 which was an increase of 1.2% over September and 2.6% above October of last year.

There were 397,000 telephone and telegraph employees last October, a decrease of 0.1% when compared with September but a rise of 3.1% as contrasted with the same 1939 month.

Radio-Telephone Service With Greece

Greece came within reach of Bell and Bell-connecting telephones in January when the A. T. & T. Company's transatlantic telephone service was extended to include that country. This new service will provide by means of a short wave radio circuit between New York and Berne, Switzerland, from there to Athens by means of land lines via Zurich and Belgrade.

The rate for a three-minute call between points in Illinois and Indiana and Greece will be $29.25 during the day and $22.50 at night and on Sundays.

NOTICE TO ADVERTISERS

Reservations should be made now for space in our April Spring Construction Number. Outside construction for 1941 will probably break all records.

Short Course in Telephone Transmission

(Continued from page 22)

The action in a mercury vapor tube is shown in Figure 20. The term "internal resistance" refers to the tube's internal resistance which appears in series with the current output of a rectifier tube.

Internal Resistance Low in Mercury Tube

THE higher the resistance, the greater the voltage drop which will result when current is flowing through it. It should be kept in mind that this is an "electronic resistance" rather than a conductive resistance, such as we are accustomed to in thinking of resistors.

The fact that the mercury vapor tube has a low internal resistance is important in application requiring good voltage regulation as the voltage at the output terminals of the rectifier will not fall off as rapidly as the current output is increased, as it will with the higher vacuum tubes which usually have higher internal resistance. In other words, there is less voltage drop in the mercury vapor tube under current load than there is in the other type.

The mercury vapor tube has a lower internal resistance due to the *positive ions*, that is, the positively charged particles that are also created as a result of the collision between electrons and gas atoms. These *ions* travel back toward the cathode and tend to neutralize the repeling effect that the negative electrons emitted by the filament seem to have on each other thus increasing the number of electrons that can leave the filament.

Mercury vapor tubes have one disadvantage, when used in radio receivers, over the high vacuum type; namely, due to the presence of gas within the tube, there is an oscillatory current set up which tends to create noise in the receiver and requires a special means for filtering out the noise; however this is not a serious item.

Cold Cathode Glow Type Rectifiers

ALTHOUGH not exactly a true vacuum type of rectifier, a tube used in some power supply systems in the earlier type of radios and particularly the B eliminators that were used a number of years ago when battery sets were in style is that known as the *cold cathode glow type tube*. This type of tube is still available for replacement purposes, but is seldom found in present day power

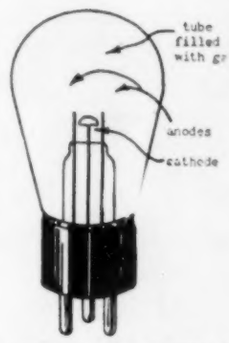

Fig. 21.—Arrangement of Elements in a Cold Cathode Rectifier Tube

supplies. It has several disadvantages over rectifier tubes of the hot cathode type.

A typical tube of this type is one consisting of two anodes and a cathode. Although this tube has three elements, it should not be confused with the triode type vacuum tube as it is more comparable with the full wave rectifier tube. In this tube, no heater element is employed; hence, the term *cold cathode*. One type of cold cathode tube employs helium gas at low pressure. Some type of gas is necessary in these rectifiers and they are often referred to as *cold cathode gaseous type rectifiers*.

Figure 21 illustrates schematically the general arrangement of the large metal cathode or electron emitting surface and the two small wire anodes supported by an insulated stem. The tube is connected in a rectifier circuit as shown in Figure *22*.

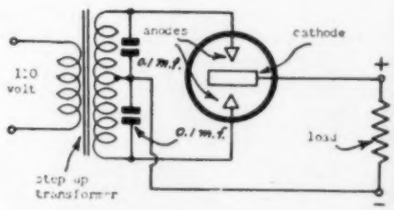

Fig. 22.—Cold Cathode Rectifier Circuit

Theory of Operation of Glow Type Tubes

THE operation of the glow type rectifier depends upon the fact that if two electrodes, one large and one small are placed in a tube filled with some gas such as helium, that under proper voltage conditions, *electrons will flow from the large to the small electrode but not in the reverse direction.*

(To be continued)

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Cooke Electric Company Elects New Officers

George E. Folds, was elevated to Chairman of the Board of Cook Electric after serving many years as president.

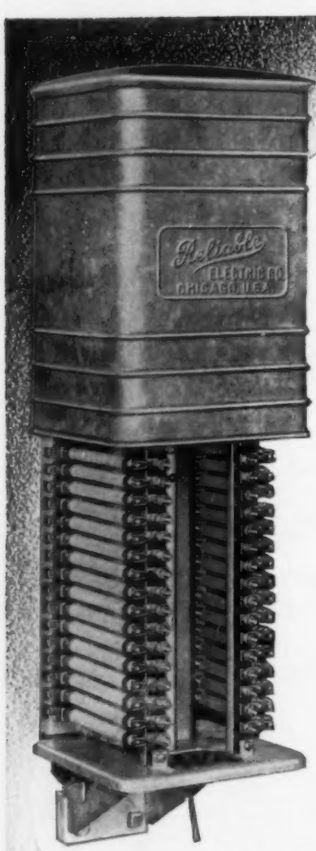
Walter C. Hasselhorn, the new President of Cook Electric is well known in management, sales and production circles.

At the annual stockholders and directors meeting of the Cook Electric Company January 27, the following were elected as officers of the corporation: G. R. Folds, Chairman; W. C. Hasselhorn, President; J. S. Baker, Vice President; C. E. Lundeen, Secretary-Treasurer; J. F. Jaap, Assistant Secretary; C. Ruth, Assistant Treasurer.

Since its incorporation in 1897, the Cook Electric Company has been engaged in the manufacture of telephone protection and distribution equipment. An important part of its output is shipped to export markets. It also manufactures heat control appliances and several kinds of electrical apparatus and at the present time is allocating considerable capacity to the National Defense Program.

Experts

The Houston, Texas, city council is studying the need for legal experts in its telephone rate investigation. The Mayor told the city attorney to go as far as he can and when more help is needed to get it. So far the legal department does not have sufficient information to create the need for more help, the city attorney said. City Commissioner Mann, however, urged that the inquiry go first in the study of fair values, depreciation etc. of the telephone plant before establishing a legal staff.



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The original design of the Reliable B27 Protected Cable Terminal is a proved standard of protection and maintenance economy. Equipped with the Reliable self-cleaning sawtooth discharge blocks, static discharges are dispelled without lag time, and unnecessary grounding and dirty carbon trouble are eliminated. All connections are made in front within easy reach of the lineman—no need to remove fuses or reach around terminal. The detachable mounting bracket permits one man installation. Exceptionally rugged construction guarantees long, dependable service.

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Obituary

George R. Grant, 58, general attorney of the New England Telephone & Telegraph Co., Boston, Massachusetts died December 28 in Wellesley. Mr. Grant had been connected with this organization since 1917. In 1939, he was elected a member of the board of governors of the American Bar Association, representing the first federal judicial district.

Roy C. Hopgood, 54, general patent attorney of the International Telephone & Telegraph Corporation, died November 26 in East Orange, N. J., following a short illness. Before joining the staff of I. T. & T., he was associated with Western Electric Company as cable engineer in Chicago and patent attorney in New York. Surviving are his widow, Mrs. Margaret Brown Hopgood and two sons, Roy D. Hopgood Jr., and Robert B. Hopgood.

Charles Huebner, 61, employee of the Illinois Bell Telephone Company for 33 years, died December 14 in Chicago. He is survived by his widow, Christina Huebner and a son, Charles A. Huebner.

Hans W. Meewes, 80, former manager of the Davenport and Tipton Independent Telephone Company, died December 8 at his home in Davenport, Iowa. He resided in Tipton from 1903 until retiring from active business in 1910.

Vitamins in Flour

Dr. R. R. Williams, director of chemical studies of the Bell Telephone Laboratories, was the prime mover in the recent plan of the flour mill industry which evolved the new kind of "enriched" flour that will contain a much higher content of vitamins and minerals than the present flour. Dr. Williams who is the leading authority in the vitamin B-1 field was a member of the National Research Council Committee on Foods and Nutrition which was instrumental in the evolvement of this new flour.

Conscientious Objectors

Among the Army activities which are deemed non-combatant to which "conscientious objectors" who are drafted will be assigned will be the construction, photographic, depot, repair or pigeon units of the Signal Corps, the War Department disclosed Jan. 18. Later the conscientious objector, if he desires, can be transferred to combatant units.

Automatic Electric Leases 6-Story Building

Automatic Electric Company has announced the acquisition on lease of a six-story building in the 1100 block, West Jackson Boulevard, Chicago, two short blocks northwest of the Company's main offices at 1033 West Van Buren Street.

Occupancy of this building, scheduled for about mid-April, will permit consolidation of miscellaneous warehouse facilities which are now scattered, and will also provide additional space for certain manufacturing and other departments which are able to operate efficiently on a self-contained basis. The move is expected to permit some re-arrangement of engineering and production facilities at the main office and factory so as to insure continuance of the Company's present high standards of service to customers.

The Jackson Boulevard building—to

Front view of the new 6-story building leased by Automatic Electric Company. It is located in the 1100 block Jackson Blvd., Chicago.

Build Goodwill and Revenue WITH THIS SMALL P·A·B·X

Key type telephones, such as the one shown above, plus this compact switching unit, provide automatic intercommunication combined with fast trunk service at low cost.

This system — the 32A — serves up to six stations and is just the thing for residences and small offices where an attended system is impractical.

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Try the 32-A. Its high service value commands a high rate, and its extra earning power will help to bring your percentage of net income to a more satisfactory level.

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be known as Building 7—is an attractive concrete structure with a facade of white face brick. Its six stories and basement provide about 110,000 square feet of floor space which is adapted to a wide variety of manufacturing, warehousing and office operations. The building has been occupied by Curtis Lighting, Inc., makers of electric lighting fixtures.

Tel-E-Facts

One telephone call a second—35,000 each working day—click automatically through the world's largest private telephone exchange in the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company. Nine million conversations were handled last year through the huge plant's internal 3000 phone system.

Among the many interesting figure stories on internal communications, the following, gleaned from John Frazier, Manager of telephone and telegraph communication, are especially fascinating: The East Pittsburgh Works own 113 page telephone book lists, 23 Smiths, 16 Williams, 15 Jones, but only 9 Johnsons.

At East Pittsburgh's central teletype office 14 operators, using 11 teletype machines, handle almost 65,000 messages each month. In one month last year, 400 telegrams an hour passed through the East Pittsburgh central office.

Foreign messages (before the war) were received regularly in Spanish, French, German, Russian, Portuguese, Italian, Swedish, Norwegian, Dutch, Polish, Czechoslovakian, Hungarian, and Japanese. Most frequent foreign language communication is in Spanish. Japanese cables employ English letters—not their own characters.

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FOR SALE: New West Test set used only one year, price $20.00. Address Frank Rada, Armour, South Dakota.

POSITION WANTED: Graduate engineer with broad experience telephone engineering wishes to change his position. Excellent recommendations. Address Box 8261, TELEPHONE ENGINEER.

WANTED: Man between 30 and 40 capable of engineering and supervising plant operations for company with large number of small exchanges. Furnish complete details as to qualifications and experience and attach small photo. Box 8260, TELEPHONE ENGINEER.

Roebling's Name H. E. Thorn

John A. Roebling's Sons Company, Trenton, New Jersey, announce the appointment of Horace E. Thorn as Manager of their Philadelphia Branch Office.

Mr. Thorn will have charge of sales and local stock of Roebling's complete line of Wire Rope, Electrical Wires and Cables, Cold Rolled Flat Wire and Specialties and Woven Wire Fabrics.

Tennessee Exchange Shows Large Growth

The Kingsport, (Tenn.) Times during January hailed the progress made by the Inter-Mountain Telephone Co. exchange at Kingsport with the installation of its 4,000th telephone. The article compared the growth and number of telephones with other cities of equal size and find the Kingsport record is far ahead in the comparison.

Figures released to the Times by Aubrey A. Woolford, manager of the Kingsport office, showed a steady rise during the past 17 years, even during the depression. In 1924 there were only 596 stations in operation. In 1930 this figure jumped to 1339. From 1930 to 1935, when most companies were showing losses, the stations jumped to 1808. By 1940 there were 3411 and by this January the figure had jumped to 4000.

Doubles Sales

The Shauer Machine Company, Cincinnati, O., manufacturers of rectifiers and electric tools, reports 1940 sales were 100 percent in excess of 1939. The company paid a year-end bonus of 3.8 percent of total yearly salaries and wages to employees plus an extra sum for each year of service. A. J. Kohn is president and sales manager of the company.

W. J. Henneberry Named By L. M. Berry & Co., Ltd.

L. M. Berry & Company, Limited, Telephone Building, Winnipeg, Manitoba, Canada, the Canadian affiliate of L. M. Berry & Company, Dayton, Ohio, telephone directory advertising agents, announce the appointment of Mr. W. J. Henneberry as Canadian Manager of the Company, and also his election as Vice President. Mr. Henneberry has been associated with L. M. Berry & Company, Telephone Building, Dayton, Ohio, in a sales capacity since 1929.

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Kellogg No. 79 Central Battery Ind. Coils @	.45
Kellogg Local or C. B. Transmitters complete with back and mouthpiece @	1.10
Kellogg No. 103 500 ohm line drops and jacks 10 per strip @	16.00
Kellogg No. 631 Central Battery Steel hotel sets with straight line ringers and booster coil @	7.00
Monarch or Leich Local battery transmitters with back and mouthpiece @	.90
Stromberg Carlson No. 896 3-bar 1000 ohm ringer inside connection compacts with Short arm @	7.5
Western Elec. No. 534 Steel signal sets with enclosed gong 1400 ohm ringer and Booster coil and Cond. @	4.50
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